

Ranganathan's Philosophy

Assessment, Impact and Relevance

Edited by
T S Rajagopalan

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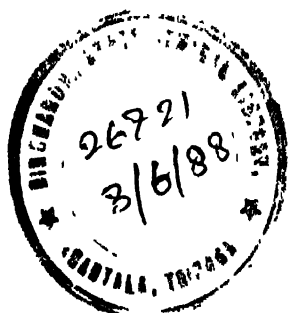
ASSESSMENT, IMPACT AND RELEVANCE

*Proceedings of the International Conference Organised by
the Indian Library Association and Co-sponsored by
Sarada Ranganathan's Endowment for Library Science*

REFERENCE

Edited by

T.S. RAJAGOPALAN



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Foreword

Gandhian philosophy is in danger of being forgotten in the country of its origin. Mahatma Gandhi has been deified in India simultaneously. This dialectical process is typical of Indian culture and civilization throughout the centuries. It shall indeed be surprising, if the case of Dr. S.R. Ranganathan were to be an exception to the general rule. Dr. Ranganathan has been mumified by his self-proclaimed followers. They seem to be insistent on having inherited his legacy unilaterally. His thought is treated like incantations chanted ritually like *mantras* without comprehending their true meaning or significance.

There are striking parallels between the life and times of Mahatma Gandhi and S.R. Ranganathan. Both of them were contemporaries. Both of them were primarily modernizing agents employing a traditional idiom. Like Gandhiji, Ranganathan would have preferred to have opted for truth rather than logical consistency. His Canon of Recall, apparently going back on all he stood for, is a classic example of the same.

Both of them were in the process of perfecting a conceptual framework during their life time by marrying tradition with modernity. Like Gandhian thought, Ranganathan's philosophy was a open-ended system welcoming new ideas, incorporating those within the system and eventually re-structuring the whole framework. His ideas were cyclical in the dialectical sense of the term by changing quantity into quality and thereby bringing about a revolution without those involved from within being cognizant of the same.

Ranganathan has been charged with expressing himself through obtuse ideas. The charge sticks to some extent. He has coined a whole range of terminology, some of which is rooted in the Indian tradition. Communication thus becomes a problem with the rest of the world. Since he wrote enormously and had the Brahmanic aptitude for preaching (and verbosity), the chaff in his writing has to be separated from the grain.

Surprising as it may seem, there is not a single critical piece of writing evaluating the work of Ranganathan in a large perspective. Similarly, little work has been done on his special for-

mutations in areas like subject indexing in this country. Equally, no attempt has been made to re translate his concepts in terms of present-day methodology. All these areas are virgin fields awaiting exploitation.

The opportunity has apparently passed by the generation which was so near to him and is now on its way out. Much is expected from the coming generation with its grounding in modern techniques as well as its training in Ranganathan's ideas to provide lead within the country as well as to view Indian librarianship as a part of the international mainstream.

The papers submitted to the Ranganathan conference give much hope for the future. There is obviously a ferment in the mind of many. It remains to be exploited. The process has begun and shall inevitably continue through its sheer volition and momentum because of its social relevance and necessity.

GIRJA KUMAR

President,

Indian Library Association, New Delhi

Preface

Ranganathan, dedicating his full life, left a rich legacy, through his original contributions, innovative ideas and new knowledge, to endow library science with a content and meaning that could meet the challenges of all times in information handling and service. However, in a changing context when application of information technology has revolutionised the organisation, provision and use of information, questions are asked such as: Is it that Ranganathan's concepts and ideas are still current and valid? Is it that Ranganathan's theories and techniques are capable of new interpretations or new applications in a changing context and for that matter relevant now? Is Ranganathan to be followed in a total faith? Cannot Ranganathan's ideas and techniques be adapted/adopted to solve current day problems? Would Ranganathan have changed now some of his ideas in consonance with his canon of context? and so on. The present Conference which aims to make an assessment of and study the impact and relevance of Ranganathan should help to find answer to such questions. It is gratifying that a large number papers contributed to the Conference by eminent specialists in library and information science from many parts of the world have dealt with comprehensively and convincingly issues corroborating the relevance of Ranganathan's philosophy and assessed the impact of his contributions to the existing body of knowledge in library and information science.

How Ranganathan's Five Laws of Library Science are classical and are as fresh in their message today as they were first propounded in 1931 are evident by ten papers contributed on this topic to the Conference. The papers portray clearly the penetrating significance of the Five Laws at all times to come. It is a known fact that Ranganathan began to receive world-wide recognition on account of his work in classification. He was the originator of analytico-synthetic model/faceted scheme of classification. His theories of classification would be studied with a great deal of attention by all those engaged in designing systems for intellectual organisation of information. The largest number, i.e. sixteen papers are devoted to classification. They

reflect successfully the rich source of knowledge embedded in the works of Ranganathan on classification.

Perceiving the symbiotic nature of classification and cataloguing, Ranganathan devised the chain procedure for subject indexing. This simple and sure technique was quick to be recognised, began to be widely adopted/adapted and set the pattern for all pre-coordinate indexing models. Three papers highlight the quality and efficacy of chain procedure. Ranganathan advocated classified catalogue. He bestowed particular attention to document description and enunciated principles and canons for cataloguing, in order to have a scientific approach. Instances are many where his principles and canons of cataloguing are followed in other codes. There are six papers devoted to cataloguing in this volume.

The Madras University Library was the testing laboratory for Ranganathan to apply the principles of scientific management, which he arrived at by experience as a practising librarian. Ranganathan could see the essence of present day system approach even in the thirties when he was working on the principles of scientific management of libraries. He introduced terms like librmetry and bibliometry and brought to focus their importance in planning and management of library services. A chapter devoted to these aspects carry six papers.

Ranganathan was the earliest to introduce reference service as a subject of study in library science. He wrote a book on reference service, incorporating many case studies. He gave a philosophy of his own for offering reference service in libraries. Four papers describe Ranganathan's contributions to reference service as a subject of study. Ranganathan was a pioneer in evolving standards for library and information work. He recognised the importance of standardisation to bring about economy and efficiency in the tools and techniques that are to be used. There is one paper giving a subjective view of standards in documentation.

The students, disciples and those who have come in contact with him personally could alone perhaps speak about Ranganathan's eminence as a teacher. It is no over-statement if he is described as a teacher *par excellence*. Education and training in library and information science in India owe to him and for that matter library profession in India is his making to a very large extent. There are seven papers dealing with education and training in library and information science.

Though information technology was not in usage at the time of Ranganathan, a closer examination of his writings in later period would indicate that he visualised the prospects of automation in library and information management. Surely he would have given purposeful direction for the application of information technology in library and information work, if he were to be present now. Two papers cover the area of information technology to give a representation to recent developments.

Ranganathan is rightly described as the Father of Library Movement in India. He was instrumental in introducing library legislation. There is one paper giving an account of Ranganathan's role in introducing library legislation in India. The last chapter on Ranganathan as Humanist carries four articles, describing his personality and the inspiration he offered to the professionals.

While as much care as possible was taken to organise the papers in a number of chapters (coinciding with the sessions of the Conference), there were practical limitations to give a balanced representation to the various topics covered by the theme of the Conference. There was also a time constraint to edit the text to conform to a uniform presentation throughout. It is hoped that the readers will understand the difficulties inherent in producing a pre-conference proceedings volume, carrying a large number of papers contributed by a diverse group of sixty nine authors.

T.S. RAJAGOPALAN

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Professor S R. Ranganathan – A Short Biography

M.A. GOPINATH

1 BIRTH AND PARENTAGE

Ranganathan was born in Shiyali in the Tanjavor District of Tamil Nadu (then part of Madras Presidency) in his maternal grandfather's house in North Rampart Street, (*Vadakku Modavilaga Theruvu*) around 9.30 A.M. on 9th August 1892. It was a Gayathri Japam day in the month of "Adi" of the year Nandana. On that day and at that time, South Indian Brahmin's recite Manthram to Gayathri to redeem them from the sins committed by them thus far. His Janmanakshtra was "Danista" and legna "Kanya". He was the first child of his parents and the first grandchild of the grandparents both paternal and maternal. His father, Ramamirta Ayyar, belonged to the village of Ubhayavedanthapuram in the Nannilam Taluk at Tanjavor District. He was a landlord holding a medium-sized landed property of wet land growing paddy, the principal food-crop of the Cauvery delta. He was a learned and cultured man used to giving Ramayana *Pravachanam* to small audiences, influential, and was held in high esteem by the people of the neighbourhood and by visiting officials. Seethalakshmi, the mother of Ranganathan, was a simple and very pious lady. The parents had three sons and a daughter—one of the sons died early and the daughter was posthumous child.

Ramamrita Ayyar died (on 13 January 1898) rather suddenly after about of illness at the age of 30, when Ranganathan was only six years old. Ranganathan's mother survived this loss for nearly 55 years and died at Delhi due to a fire accident at the home in January 1953. Ranganathan's another brother Natesan died in 1964 at Madras and his sister is alive.

2 FAMILY LIFE

Ranganathan married early when he was fifteen years old lad

in 1907. Rukmini was his wife's name. She was very devoted to Ranganathan and an able house keeper. But she died in an accident on 13 November 1928 at the Parthasarathy Koil Tank, Triplicane, Madras where she had gone for a bath. The couple had no children. Ranganathan married again in 1929 to Smt. Sarada in December 1929; she was also devoted to Ranganathan and helped him to work ceaselessly for the cause of the library profession. She even goaded him to donate large sums of money for the chair of library science and to the Endowment. She died recently at the age of 78 years on 30 July 1985 in Bangalore

Ranganathan was blessed with only one son Shri R. Yogeswar, born in 1932. He is an Engineer by profession and is an international consultant on machine tool design and development. He has two grandsons and a grand-daughter. All of them are living in Luxembourg.

Ranganathan had a simple taste for food. Would not waste money and energy. Would not tolerate fools and bad characters. He was sympathetic to good persons, encouraged intelligent students and guided them towards better goal and achievements.

3 EDUCATION

Ranganathan's education was inaugurated on Vijayadasami day in October 1897 with "Aksharabyasam" at Ubhayavanathapuram near Shiyali. After this, Ranganathan was admitted to a school in Shiyali, and was handed to the care of Subba Ayyar, a brother of his maternal grandfather and a primary school teacher. During his school days, Ranganathan came under the influence of two of his teachers who shaped his mind—R. Anantharama Ayyar and Thiruvengkatachariar, Sanskrit Teacher. From them Ranganathan learnt about the life teachings of Nayanmars (Shivaite Bhaktas) and Alwars (Vaishnavaites Bhaktas). Depth of scholarship and essence of life were ingrained in Ranganathan which kept in good stead in his later life to make decisions at crucial junctures.

Ranganathan attended the S.M Hindu High School at Shiyali and passed the Matriculation examination in 1908/1909. Ranganathan passed the examination in First Class, in spite of his suffering from sickness, anaemia, piles, and stammering. In his high school career he came under the influence of P.A.

Subramanya Ayyar, a scholar on Sri Aurobindo.

Ranganathan joined the junior intermediate class at the Madras Christian College in March 1909. Even in those days, there were paucity of college seats; Ranganathan was picked up for his excellent marks in all the subjects and the Principal Skinner spotted him in a crowd of students and admitted him into the course. Ranganathan passed the intermediate with a first Class in March/April 1913. In June same year, he joined the M.A. class in Mathematics with Professor Edward B. Ross as his teacher. Being a favourite student of Ross, Ranganathan had an excellent Guru-Sishya relationship. More than class room discussions, corridor and staircase discussions were taken recourse to. This trait Ranganathan ingrained into his own disciples later on. Ranganathan did his Master's degree in 1916 and he wanted to be a teacher of Mathematics. He also took a course in teaching technique and gained L T Degree from teacher's college.

During his college days, Ranganathan cultivated intimacy with his teachers, Professors Moffat and J.P. Manickam of Physics, Prof Sabhesan of Botany, Prof. Chinnathambi Pillai and L.N. Subramanyam of Mathematics. But Professor Ross remained his favourite Guru throughout his life.

4 TEACHING CAREER

In 1917 Ranganathan was appointed to the Subordinate Educational Service and worked as Assistant Lecturer in the Government College in Mangalore and Coimbatore between 1917 and 1921. In July 1921, he joined the Presidency College, Madras as Assistant Professor of Mathematics. At Mangalore and Coimbatore, Ranganathan taught physics and Mathematics and at the Presidency College, he taught Algebra, Trigonometry and Statistics. He was a follower of the individual method of teaching putting discussion method into active use. The classes used to be lively, learning-active, and teaching-purposive. Ranganathan earned an epithet "born teacher". He would interpose his teaching with many anecdotes and examples from life which would keep his students engaged and attentive. Each hour of his class used to be punctuated by applause. He also adopted assigning students with new topics, gathering data from books, and learning from discussions among themselves and amidst teachers. He organized several seminars and collo-

quia for students. He continued the same methods with greater vigour in teaching library science to students.

Ranganathan was also active in extracurricular activities. From 1921 to 1923, he was Secretary of the Mathematics and Science Section of the Madras Teacher's Guild. He roused public awareness by lectures. He introduced some uniformity and standardisation in compiling the question papers for various examinations.

He obtained pension facilities for private school teachers through his writings in papers and association journals. He augmented the finances of the Indian Mathematical Society. He was a popular figure in the mathematical circles and was regarded as an efficient organiser of meetings. His friends have quoted Ranganathan's attitude to work, thus: 'our right is only to do the work falling to our share, never to the fruits of our work. Flirt not with fruits'.

5 TOWARDS LIBRARIANSHIP

Ranganathan left Presidency College in January 1924 to take an appointment as the first librarian of Madras University. It was natural for Ranganathan—who was a lively teacher and had thrilling intellectual experiences with students and faculties of the Presidency College—not to opt for the post of librarian, even though it carried a handsome salary. Ranganathan quite often narrated to us that he never wished to be a librarian. He said that Providence had made him one, for which he never regretted in his later life. An accidental meeting with a Secretary of the Madras Provincial Government, along with an old colleague, triggered the movement towards librarianship. Ranganathan's colleague practically forced him to apply for the post; and in spite of his diffidence and lack of interest, his colleagues and supervisors—being keen on using his innate abilities—saw to his appointment as the Librarian of the Madras University in 1924. He took charge of the University Library at 4.00 P.M. on Thursday, 4 January 1924. But Ranganathan was back within a week at Presidency College to plead with the Principal, 'I have come with a specific request. I can't bear the solitary imprisonment day after day. No human being, except the staff. How different from the life in the college'. The principal, Mr Dunean, had to pacify him by saying: "If you feel bored even after you return from England, I shall

certainly take you. I shall see that your place in the college is not permanently filled up till you come back from your travel and training abroad". [Ranganathan (S.R.). *A Librarian Books back*. Herald of Library Science. 2; 1963; 130].

Ranganathan left for England in September 1924 and returned in July 1925, after 9 months of study-cum-observation. In England, Ranganathan came in close contact with W.C. Berwick Sayers, Chief Librarian of Groydon Public Library and a lecturer in the University School of Librarianship, London. Under his guidance, Ranganathan visited a large number of libraries. He witnessed there how libraries had become community reading centres. He also found how the libraries rendered service to all strata of the society: to children, to the working class and to women, besides other groups. This made a lasting impression on his mind; it considerably changed his outlook and he discovered a social mission on his mind; thus, he discovered a social mission for the library profession and for himself. The impact of these experiences was expressively stated in 1931 by Sir P.S. Sivaswamy Aiyar, one of the enlightened statesmen of Madras Presidency at that time:

"He has brought to his task extensive knowledge of literature on the subject of libraries, personal acquaintance with methods of management of libraries in Britain, trained analytical intellect and a fervid but enlightened enthusiasm for the library movement. He has been the pioneer of the library movement in the Madras Presidency and has been carrying on an energetic propaganda to spread it. He knows how to rouse and sustain the interest of the reader. (Foreword to Ranganathan (S.R.). *Five Laws of Library Science*. 1931. p. xxxii].

6 ACTIVITIES AT MADRAS

After returning to Madras, Ranganathan began a mission for librarianship. He began to reorganise the University Library. His first concern was to attract more readers to the library and provide facilities for them. He took it upon himself to educate the public on the benefits of reading to one's society and to oneself. He charged the library with a mission of self-education for every one. He used mass media to make the library hum with activity. The University Library soon acquired a niche in the world of the enlightened public of Madras. The Government of Madras took a keen interest in this and provided a

handsome annual grant on a statutory basis.

Within the Library, Ranganathan initiated behind the scene work in several aspects of the library *ab initio*. Here emerged the Five Laws of Library Science, the Colon Classification, the Classified Catalogue Code, and the Principles of Library Management. Active reference service in the form of bibliography and personalised reference began to blossom. He introduced open shelves system and provided open access. This gave impetus for readers to come quite often. An atmosphere throbbed with human activity and intellectual atmosphere. Ranganathan designed a functional library building near Madras Beach. All these changes did not happen in a piecemeal but were developed in a holistic manner, inspired by his Five Laws of Library Science. 1. Books for use; 2. Every reader, his book; 3 Every book, its reader; 4. Save the time of the reader; and 5. A library is a growing organism.

Outside the library, Ranganathan launched an endless and eternal mission. He gathered the enlightened persons of the area and formed the Madras Library Association, which became the living symbol of the library movement. Ranganathan worked as the Founder Secretary from 1928 until he left Madras in 1945. He pushed the library movement to the far corners of the Madras Presidency, which at that time covered almost two-thirds of South India. Looking at his efforts today, after nearly 60 years, we see that the public library network is quite widespread in South India. The seed sown by Ranganathan has been cultivated for nearly 60 years, and it is currently yielding fruits.

A school of library science was also initiated by Ranganathan in 1929, first under the auspices of the Madras Library Association and later taken over by Madras University. Ranganathan was the director of the school for nearly 15 years. Later in 1957, during centenary celebrations of the University, he donated his life's savings of one lakh rupees to the University to endow a chair known as Sarada Ranganathan Professorship in Library Science. The students of this school have taken leading parts at all levels of activity-local, national, and international.

7 ACTIVITIES OF BANARAS

Having done active library service for 21 years, Ranganathan sought voluntary retirement in 1945 and wanted to do active

research by himself. But he received an invitation to develop the library system of the Banaras Hindu University, by the then Vice-Chancellor Sir S. Radhakrishnan. At Banaras, Ranganathan found the library in a chaotic condition. He reorganised the entire collection single handedly, classified and catalogued about 100,000 books with a missionary zeal during 1945-47. He also conducted the Diploma Course in Library Science during the same period.

8 ACTIVITIES AT DELHI

Ranganathan moved over to Delhi University in 1947 on an invitation from Sir Maurice Gwyer. He did not take the responsibility of organising the library. He confined himself to teaching and research in library science: Professor S. Das Gupta, one of Ranganathan's brilliant students, became the librarian of Delhi University. Delhi began its course in Bachelor of Library Science and Master's in library science between 1947 and 1950. It was probably for the first time in the whole of the Commonwealth Studies. Study circle and Research circle meetings were organised. The Research Circle met every Sunday at his residence. Many new ideas and innovations began to emerge. Team research began to develop. Ranganathan was also elected as President of the Indian Library Association (=ILA) and Shri S. Das Gupta was elected as the Secretary. The Association was activated and as part of its programme a confluence of three journals *Annals*, *Bulletin*, *Granthalaya* were founded. An intonym ABGILA was given to this composite, three-in-one periodical. The *Annals* contained research papers of the Delhi Research Circle and soon gained international acclaim. The Indian Library Associations Conferences were oriented more towards problem solving than to descriptive presentations.

While Ranganathan was in Delhi, his international contacts began to grow. He had a close liaison with Denker-Duyvis, the then dynamic Secretary-General. Ranganathan was the Chairman of the Classification Research Group of the International Federation for Documentation (FID) between 1950-62, he produced 12 research reports for FID and from 1962 he was the Honorary Chairman of FID/CR till his death in 1972.

While he was in Delhi, Ranganathan drafted a comprehensive 30 year plan for the development of library system for

India as a whole. He was intimately involved in the founding of the Documentation Committee of the Indian Standards Institution of which he was the Chairman till 1967. In 1950, he founded the Delhi Public Library System and in 1952, the Indian National Scientific Documentation Centre (INSDOC, New Delhi) was founded. During this period, he also promoted the Madras Public Library Act. He also initiated the classification Research Group at London. He visited USA in 1950 under Rockefeller Foundation and wrote the book "Classification and Communication".

9 TOWARDS ZURICH

In order to gain first hand knowledge of Industrial documentation and to meet his international commitments Ranganathan moved over to Zurich. He wrote his second edition of *Prolegomena to library classification* (Published by the Library Association, London). He also regularly contributed to the *Annals of Library Science* published by the Insdoc.

10 ACTIVITIES AT BANGALORE

In 1957, Ranganathan moved over to Bangalore. He did not plan for any institutional organisation of documentation activities. But it happened that Bangalore began to be industrialised and was in its ascendancy towards metropolis. Ranganathan was helping as an adviser, the Insdoc, the Planning Commission, and the University Grants Commission. However, soon Ranganathan's solitude ended. Many young librarians of Bangalore began to gather around him. Informal discussion and research investigations were done to publish books and other research papers. The crowning point of Ranganathan's activity was in the founding of the "Documentation Research and Training Centre, Bangalore" under the auspices of the Indian Statistical Institute in 1962. The main functions of this centre are a round research and teaching activities in library and information science. Ranganathan was the Honorary Professor of this Centre during 1962-1972. He directed the institution activities with great efficiency and created an atmosphere of academic excellence and simplicity, it was like a *Gurukula*. Round Ranganathan were his young students eager

to learn from him and Ranganathan was equally eager to get the new facts from them. In 1965, Ranganathan was recognised by the Government of India as the National Research Professor in Library Science. This was also an honour to library science and librarianship. At that time, four other National Research Professors were there. (Dr. C.V. Raman (Physics), S.N. Bose, (Physics), P.V. Kane (Law) S.K. Chatterjee (Literature and Linguistics). Ranganathan was honoured by Delhi University and Pittsburgh University by awarding Doctor of Letters degrees in 1948 and 1964. Ranganathan received these awards and honours in simple and humble stride and advised his students to do hard work saying that reward would come in appropriate time. He said "God has chosen me as an instrument, the honour done to me should act as an incentive to the younger generation to devote their lives wholeheartedly to library science and service". Most of his salary as National Research Professor and the royalties on his books were donated to the Sarada Ranganathan Endowment for Library Science (1961). During the last five years Ranganathan abstained from travelling and did deep thinking and intensive writing. He wrote many books and articles. He founded *Library Science with a slant to documentation* and edited it till 1972. He revised his Prolegomera. He postulated "Absolute Syntax" for indexing language. He kept on working on colon classification and proved that the design and development a scheme for classification is a life time activity. Until the end of his life, to the very last day, Ranganathan kept on working. He died on 27 September 1972 after the fruitful 80 years of his life. While he himself contributed to the field of library service, science and profession, he catalysed a human movement whose manifestation is witnessed even today. He wrote sixty books and 2000 articles.

His life was a symbol of immortality. The integral nature of Ranganathan's theory emerged from occasional intuition; and his intellect strove to make it more explicit to the national mind of the scientific worker. His contributions sometimes bordered on a poetic beauty and sometimes on uncouth prose—but his life and work in the field of library science modelled an ever-inquiring mind, well-entrenched in the philosophy of *Bhagavad Gita* (Chapter 18, Verse 26).

“That worker is a *Satvika*, who has given up attachment, who is free from ego, who is endowed with will and cheerfulness, and who is equally unaffected whether the work becomes a success or failure.”

SECTION 1

LAWS OF LIBRARY SCIENCE: GENERAL

1.1 Library is a Growing Organism: An Open System Perspective

BHOOSHAN LAI and (MRS.) RATNA KAUSHIK

Attempts to discuss fifth law of library science, which enunciates that "library is a growing organism", and it "has all the attributes of growing organism", in the light of open system theory. Defines the open system concept. Details the characteristics of an open system proposed by Katz and Kahn. Develops a theoretical background of the library as an open system, and explains how it interacts with the environment, receives input, transforms input, and exports output. Verifies theoretically, that the growing organism perspective of library shares the open system characteristics and concludes that library like an individual is flagrantly an open system.

1 OPEN SYSTEM : A PREAMBLE

An open system is a system that ingests energy from the environment, usually in a form different from the form in which it was ingested (Von Bertalanffy, 1956). A closed system has tendency to move toward a static equilibrium and entropy. Contrary to the closed system, an open system is in continual interaction with its environment and achieves a steady state or a dynamic equilibrium while still retaining the capacity for work or energy transformation. All social systems are open systems because they are acutely dependent upon their environment. The open system recognizes that the social systems, like living systems, are in dynamic relationship with their environment and receive various inputs, transform these inputs in some way, and export outputs back to the environment (Fig. 1). The receipt of inputs in the form of material, energy, and information allows the open system to offset the process of entropy.

An open system view of a social system has provided basis for development of a comprehensive organization theory. The open system perspective of organizations has been fully developed in the work of Katz and Kahn (1966). They suggest that all open systems share nine common characteristics :

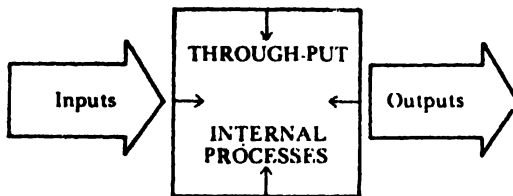


FIG. 1. An Open System.

1 *Importation of energy* : Organizations acquire energy in the form of people and material.

2 *The throughput* : The energy imported is processed or transformed to create a product.

3 *The output* : The processed product is exported to the environment. The output is utilized, consumed, rejected, etc., by the environment.

4 *Systems as cycle of events* : The export of energy makes possible an import, which makes possible processing and output, which makes possible a fresh input, ad infinitum.

5 *Negative entropy* : The energy is stockpiled to arrest decay.

6 *Information input, negative feedback, and the coding process* : Information provides signals from the environment, and negative feedback indicates deviations. It is a control mechanism.

7 *The steady state and dynamic homeostasis* : Open systems tend to maintain their basic structures. The system may change due to change in environment, but would attempt to control disruptive external factors. As growth and expansion occur, a new character may develop that may serve as homeostatic basis.

8 *Differentiation* : Open systems move in the direction of differentiation, elaboration of roles, and greater specialization in the functions performed by their parts.

9 *Equifinality* : Multiple means to the same ends develop with the growth of knowledge.

The Katz and Kahn approach is built around the open system theory promulgated by Von Bertalanffy (1956). Their energetic input-output model demonstrates the essence of open system approach. All social systems are affected by what they acquire as input, what transpires inside the system, by the output of the organization, and the nature of the environmental acceptance of the organization.

The open system perspective of library, as a social institution, is not new to us. Dr S.R. Ranganathan, as early as 1931, enunciated that library is a growing organism, and has all the characteristics of a living system. The growing organism concept is an open system perspective of a library. The library as a living system "...takes in new matter, casts off old matter, changes in size and takes new shapes and forms" (Ranganathan, 1963; p. 326).

This paper attempts to develop a theoretical framework of library as an open system, and verify, theoretically, the growing "organism" (open system) perspective of Dr. S.R. Ranganathan in the light of nine characteristics propounded by Katz and Kahn (1966).

2 LIBRARY: AN OPEN SYSTEM

Primarily libraries were nothing more than storage places, the contents of which were closely guarded (closed system). The relationship between the library users and those in control of the library was intensely personal. With the rise of scholarship and coming of renaissance and reformation, the accessibility to libraries was somewhat broadened. The democracy in knowledge brought revolution in the literary demands. The libraries became scientific information institutions designed to assist in raising educational, cultural and professional standards of the masses (Chubarian, 1976). Libraries acquired a special significance in intellectual, research and development of technology and industrial activities of a nation (Kaushik, 1975), resulting in a radical change in the initial activities of the libraries (storage places) and transforming into dynamic social institutions (open systems), responding, as required, to the needs of environment (Wesserman, 1972).

The activities that take place in the provision and use of library services appear to be highly susceptible to interference

by and interaction with things external to the system. As a social system the library is capable of being affected by its environment. The parts of the library system are simultaneously parts of other systems. For instance, the library clientele are parts of other systems, e.g., universities, families, occupational groups etc., and their information gathering behaviour ranges, in addition to a particular library, to other libraries, bookshops, newspapers, and colleagues (Campbell and Metzner, 1950).

Defining the boundaries of a library would be an arbitrary process, especially when dealing with an open system. Boundaries of a library can be redefined to ensure that importantly related aspects of the environment are not ignored. Libraries apart from their internal systems and procedures participate in at least three other wider systems: (a) the large political system, e.g., university, firms etc.; (b) the universe of publishing and bibliographic control; and (c) systems of libraries and librarianship (Buckland, 1983). No library is self-sufficient in terms of human, financial and material resources. They depend on other libraries for resource sharing and more recently on the collective use of computerized data bases to augment their resources. Both libraries and users are intimately involved in the continuously changing of human knowledge, forcing the library, to be dynamic living organization, responsive to the immediate needs, but with an awareness of the anticipated needs of the future (Eggleton, 1978), and survives like a growing organism (Ranganathan, 1963).

3 OPEN SYSTEM CHARACTERISTICS OF LIBRARY

Organizations are established for pursuit of relatively specific objectives. The chief objective of a library is to acquire reading material in the form of books, periodicals, thesis, standards, patents etc. (importation of energy), for study and research; process and organize it (through put), and transfer it to user. The principal product (output) of a library is transfer of information on demand or in anticipation of demand. A library may have additional objectives, including its own maintenance and survival, organizational stability and growth, financial solvency, training and research and various employee related objectives, but all these are subsidiary to the key objective, that is, precise, accurate, and timely dissemination of

information to clientele, which constitutes the basic organizing principle that underlies all activities in a library.

The library users are both information processors and information stores. They create information, extract information, and intellectually process it, and store it for immediate and later use. Some of them return their stored and processed information in the form of a new document or energy (Auerbach and Landau, 1974), which could be a potential piece of acquisition for the library, and its importation may trigger a new cycle (system—a cycle of events). Ever-increasing avalanche of information is the result of the continuous cycle of events that affects the libraries' ability to cope with the total volume of the information produced. Famous quotation of Ralph Waldo (1803-1882) explains the "cycle of events" as :

Meek young men group in libraries, believing it their duty to accept the views which Cicero, which Locke, which Bacon, have given; forgetful that Cicero, Locke and Bacon were only young men in libraries where they wrote these books.

The exponential growth of information and sharp realities of the laws of economics, have made libraries inadequate. No library, today, is self-sufficient in terms of collections, personnel, and services (Steven, 1980). Despite these constraints procurement of reading material is a continuous process in a library, but only a fragment of what is published is acquired (Eggleton, 1978). The advent of computers; which provide massive capacity to store bits of information and an almost infinite capacity to manipulate, arrange, and select items committed to its memory, and satellite communication system, has made possible global resource sharing among libraries. Libraries have established network system to share basic resources and augment their inadequacies (Markuson, 1980). By this exchange relationship the libraries are able to exploit the environment, through automated and highly sophisticated machine-based control system, to provide expressive satisfaction to its clientele and to acquire a state of negative entropy (Negative entropy).

The information needs of users vary from person to person. It is prerogative of a library to make available each user reading material according to his needs (Ranganathan, 1963). The

great quantity of information produced, today, has the potential to enable a man to shape the world to his choosing, to conquer his ills and deprivations. But it can imprison him too. The flood of information, if unorganized and uncontrolled, can obscure and confuse a user instead of clarifying and informing (Schneider, 1971). A library is most effective when the turn around time to satisfy a clientele is minimum (Hamburg et al., 1974). In order to evaluate the performance of the system the users are asked by the system operators their reactions. Schneider (1971) feels that recipient's reaction to the status of the information supplied and impact of the information on his work help evaluation of the effectiveness of the system. Such feedback from the users helps updating both user and document profiles to correct deviations (Information input, negative feedback, and coding process).

The enormous mass of information produced has caused physical crisis (Overhage and Harman, 1965), because to store it needs space beyond imagination. The advent of microfilms, microfiche, tapes, punched cards, holograms cassettes or discs, and electronic computer memory has resolved the crisis to some extent (Lal, 1984). Under the conditions of growth and expansion the libraries have changed in size and taken new shapes and forms (Ranganathan, 1963), and a new character has developed which is serving as a new homeostatic basis (The steady state and dynamic homeostasis).

The library as a system has a network of inter-dependent subsystems, e.g., acquisition, technical processing, circulation, reader assistance, etc. Each component of the network has fairly specialized function and a distinctive nucleus of operative procedures and rules. Each subsystem is designed to perform differentiated tasks. The actions of each component are coordinated so that the output of each subsystem put-together fulfil the goals of the library (Differentiation).

The main objective of a library is to disseminate accurate, precise, and timely information on demand and in anticipation of demand. The expansion of knowledge in a variety of forms like articles, patents, thesis, lectures, reports etc., and difficulties in retrieving particular piece of information from the accumulation has brought intellectual crisis (Miller, 1978). To resolve this crisis libraries have devised techniques like current awareness service, selective dissemination of information, compilation

of subject bibliographies, in-depth abstracting and indexing, and storage of information on magnetic tapes and discs for infinite capacity of manipulation, to disseminate the information. These are the multiple means to the same end (Equifinality).

From the foregoing discussion it can be seen that the energetic input-output characteristics of social institutions are also the attributes of a library. This confirms the basic hypothesis of Dr. S.R. Ranganathan; who stated that "A library is a growing organism. It is an accepted biological fact that a growing organism alone will survive. An organism which ceases to grow will petrify and perish. The fifth law invites our attention to the fact that the library, as an institution, has all the attributes of a growing organism. A growing organism takes in new matter, casts off old matter, changes in size and takes new shapes and forms. Apart from sudden and apparently discontinuous changes involved in metamorphosis, it is also subject to a slow continuous change which leads to what is known as 'variation' in biological parlance, and to the evolution of a new form. This change is so slow and effective that the protagonists of evolution assert that it is the shapeless undifferentiated protozoa of the polaezoic age that has transformed itself, by successive stages of variation, into the most differentiated specimen of creation - the human being. The one thing that has been persisting through all those changes of form has been vital principles of life. So it is with the library" (p. 326).

4 CONCLUSION

A library organization consists of patterned activities. These patterned activities are complementary or interdependent with respect to some common output or outcome; they are repeated, relatively enduring, and bounded in space and time. The stability or recurrence of activities in a library have been examined, in the foregoing paragraphs, in relation to energetic input into the system, the transformation of energies within the system, and the resulting product or energetic output.

The function that an organization fulfils in the society includes its original charter and its primary objectives. The functions carried out in organizations are ongoing processes and activities and these activities are structured to ensure effectiveness and productivity of the organization as a whole (Porter et

al., 1975). Through centuries of their existence the library system has developed numerous organizational and staff structures to keep constantly in line with the requirements, both in time and extent (Kaushik, 1969). There is a hierarchy of components in the library, each system component designed to perform differentiated tasks while filling differentiated roles, offices, or positions, and whose actions are coordinated (Howard, 1977), so that their individual outputs put-together fulfil the organizational objectives.

Libraries are solely dependent upon their environment and that the inflow of materials and human energy is not constant. Comparing the library to a person, Fellerman (1974) states that both acquire, process, store and retrieve information. Both possess personalities because of their adaptation to their environment. Both develop their capabilities through continuous interaction with the environment and are flagrantly growing organisms or open systems as hypothesized by Dr. S.R. Ranganathan.

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1.2 Ranganathan's Five Fundamental Laws of Library Science in the Context of Use and User of Public Library System in Assam

ALAKA BURAGOHAIN (PHUKAN)

Discusses the objectives behind the proposed new national education policy for the masses in the form of continuing non-formal education system and which are implicit in the philosophy of Ranganathan's Five Fundamental Laws. Shows how the demands of the laws for user and user were satisfied by Neo-Vaisnavite literature and institutions in Assam; how the impact was lost during British period, revived during Freedom Movement and violated by the existing library service. Suggests relevance of the Laws in designing programmes for a network of multi-purpose public library system as a viable unit for continuing non-formal learning for the masses which is one of the aims of new education policy. The processes and contents of the programme be woven into the very texture of life-pattern of the local socio-cultural, socio-economic and socio-political reality of the community with a growing tendency towards a pragmatic society.

1 INTRODUCTION

1.1 Educational System

I am attempting to discuss here the impact of the messages of Ranganathan's Five Fundamental Laws firstly, in the historical context of "Use" of recorded knowledge for popular education of the "User" i.e. the masses in Assam; secondly, their relevance to development of a multi-purpose public library system for the users who are to be enlightened and educated as aimed at by the new national education policy which would be announced by March 1986. A relentless war against illiteracy, ignorance and poverty of the mass people is still a burning question in our country in spite of several Five Year Plans already completed. And literacy is receiving growing importance in view of gradual change in our socio-cultural and socio-economic pattern of Indian life. Although universalisation of elementary education is a commitment in order to ensure

growth of literacy rate (36.23% in 1981 excluding Assam), existing facilities do not guarantee provision of formal education to all children. Secondly, it is found from experience that the existing formal schooling system rather alienates a large number of young people particularly in the rural areas from reality and makes them unfit to cope with the actual situations. Thus, in order to supplement as well as change the orientation of formal education effective non-formal education for the masses has become a necessity. The emphasis on adult education, functional literacy, vocational education, female education, delinking of degrees from jobs, distant learning through open university system and all sorts of non-formal learning have become the primary concern in the new education policy proposed for the Seventh Plan. Now, it is our concern if the messages of Five Laws could be explored of in making the formal education merge with non-formal education in order to educate the masses and which is the ideal form of educational system and which could be achieved by developing a multi-purpose public library system.

12 *New Education Policy*

Mr K.C. Pant, the Union Minister of Education while inaugurating the State Council of Educational Research and Training (SCERT) at Gauhati on the 9th June 1985 said that the education policy in India had so long "lacked the tradition of innovation"¹. Since the education policy of the country had been formulated on the Western models based on the Western socio-cultural needs, the pressure of Indian socio-cultural reality did not necessarily bring impact upon education policy of the country; and consequently lacked innovation. However, since the Western models themselves have undergone changes, in some points even bringing radical changes, it is fortunate that the people at the helm of national policy appear to think seriously that the country needs a change in education policy. The Union Government has published a mimeographed two-volume document entitled "Challenge of Education—a policy perspective" which is prepared with a view to furnishing the basis for a debate that will lead to the formulation of the new comprehensive and uniform national policy on education. The document is indeed frank in its analysis of the education scenerio of the country.

2 PHILOSOPHY OF RANGANATHAN'S FIVE FUNDAMENTAL LAWS OF LIBRARY SCIENCE

21 *Contents of Five Laws*

Dr. S.R. Ranganathan for the first time formulated the Five Fundamental Laws of Library Science in his book *The Five Laws of Library Science* in 1931. These Laws are logically deduced from the modern concept of library based on democratic and socialistic urge of Western society. A modern library is committed to fulfil the demands of the following five fundamental laws of library science:

Books are for use
Books are for all
Every Book its Reader
Save the time of the Reader
Library is a Growing Organism.

The first and the second laws have brought about a revolution to the fundamental concept of the older conservative attitude towards the use of a library that it was an institution meant for preservation of books to be used only by a chosen few. Thus, while the First Law emphasised on "use" and vitalised the library, the Second Law emphasised on "user" and magnified it into a nation-wide problem i.e. not only "books are for use" but "books are for all" also irrespective of class, caste, creed, sex and age. The third Law i.e. "Every Book its Reader" supplementing the emphasis on "use" would make the revolution as thorough as possible. Along with the Fourth Law, i.e., "Save the time of the Reader", the message called for a pinpointed, exhaustive, expeditious and timely use of recorded knowledge by the readers. The Fifth Law i.e., "Library is a Growing Organism" welcomed extension and intensification of its functions and services in order to cope with ever growing and ever changing situations demanding use of recorded knowledge. Behind all these laws lies the philosophy of socialization of knowledge and enlightenment stored in the documents. These five laws are very comprehensive covering each and every aspect of modern library organization, administration and service promoting the cause of use and user; their appeal is also universal.

22 Messages of Fundamental Laws and Public Library System

The earlier ideas of a library as an institution for preservation of books instead of furthering the use of books was long continuing. But in the twentieth century, democratic socialistic trends played their role in gradually evolving the modern concept of librarianship. The modern library which is a public institution and charged with the care of a collection of books and the duty of making them accessible to those who want to use them is committed also to "persuading every person within its jurisdiction to accept and continuously use its service". A modern public library organised true to fundamental laws becomes a living force of popular education in a non-formal way. A multi-purpose public library system easily manifests how far reaching could be its capabilities and potentialities in moulding the life of the community, the user, intellectually, culturally and functionally. And the public library system in developed countries has become an indispensable dynamic part of the modern society. A multi-purpose public library system in our country may prove to be a sure solution for continuing education for the users in a non-formal way; as a centre of community learning and discussion, an information bureau, it may act as a training ground for democracy, socialism and secularism as well as providing scope for functional literacy of the masses. The new education policy stresses on promoting appreciation of the basic values of socialism, democracy, secularism, non-violence, character building and spirit of nationalism in the minds of the learners in addition to vocationalization of secondary education and universal elementary education.

3 STRONG IMPACT OF THE MESSAGES OF FUNDAMENTAL LAWS DURING VAISNAVITE RENAISSANCE

31 Non-formal Learning

In historical prospective, it appears that the concept of popular education and learning in a continuous non-formal way having impacts upon people's daily life was discernible since Neo-Vaisnavite Renaissance in Assam in the later part of the 15th century. The implications of the fundamental laws of library science for continuing education of the masses seems to be understood and explored of in Assam through the use of

Vaisnavite literature and institutions very thoroughly in a favourable social atmosphere prevailing at that time during Ahom regime that showed a liberal attitude towards casteism, religion and social taboos. The processes adopted for non-formal learning of the users centering round a public library in developed countries appear to be familer to the people although purely in indigenous forms, incorporated into the very life-pattern of the people and woven into the very texture of time-honoured traditions and making them meaningful and effective³.

32 *First Law and Vaisnavite Literature*

True to the first law "Books are for use" the emphasis was given on "Use" of sastras during Vaisnavite renaissance. Sree-manta Sankaradeva who himself was an erudite Sanskrit scholar, brought out the good and noble abstract ideas which were engulfed in classical Sanskrit sastras into concrete forms of akhyanas, upakhyanas, kavyas and interpretative translations in local Assamese verses, and presented them in such a simple, splendidly expressive and lucid style that the common people could comprehend and appreciate them. He selected primarily the popularly known devotional legends from Bhagavata, Ramayana and other puranas:

Nakariba nindā mokṣa mahante
 Āsilā sastra Vārānasi hante
 Takeśe cai nibandhilo pada
 Hari Hari buli tarā apada⁴.

Purport: I may kindly be not criticised by the religious leaders. I have composed the kavyas on the sources of sastras brought from Varanasi. Calling the name of Almighty "Hari" may relieve us from all troubles.

321 His *Kīrtana-Ghosa* is a selective collection of twenty-six narrative poems (kavyas) of upakhyanas like "Prahlada-carita" etc. These narratives were adapted mostly from Bhagavata-puranic legends without any mystic appeal, although they did illumine many didactic doctrinal points with public and general appeal. These narrative poems give expressions to nine different sentiments like love, humour, anger, heroism, etc.,

but through which "Bhakti" (intense devotion) towards the incarnation of Lord "Krishna" (alternatively called "Hari") has been depicted. But the most significant thing is that these Kavyas were composed in diverse metres of marvellous rhythmic felicities in purely Assamese idiomatic expressions. And these were presented in such familiar local, intensely human and realistic backgrounds of the middle class life with popular appeal that its lively poetic imagery impresses greatly all the unsophisticated illiterate and unlettered people including the fair sex and the down-trodden castes. In order to make the underlying sentiments and morals behind his narrative poems thoroughly convincing, Sankaradeva exploited all the possibilities of auditory, rhythmic and pictorial appeals. He used the alliterative expressions in diverse rhythms and rhymes in order to facilitate committing the couplets to memory for recitation. The very name *kirtana* is suggestive that the narratives were meant for public recitation in religious services and congregations in the local "Namgharas" (prayer halls) at convenient hours by the leaders of the party and the "Ghosa"; i.e., the refrain after reading every couplet would be repeated by the leader and taken up by the rest of the gathering with clapping of hands. This had given them a sense of participation as well. And the effective influence of religion upon the subconscious mind of the people could not have been achieved by mere precepts. There is still rarely an Assamese Hindu home that does not possess a copy of *kirtana* although its earlier unique influence upon the mind and thought of sophisticated middle class Assamese people may be said to be declining fast.

322 Sankaradeva translated the Bhagvad Gita not only into Assamese words, but into Assamese idioms in order to facilitate its use. His grand, descriptive, popular pictures, pleasant humours and pathos, his use of Assamese proverbs in surprising numbers which were racy of the soil and used to illustrate facts of ordinary life, moral precepts and wisdom of the common man, made his writings full of life, intelligible and accessible to the common man; e.g.

Nite nite sije pāpa tate mahāilā
 Sālara nāvata jena bharā dilu silā.
 buri ase tanu nau nahike cetan.⁵

Purport: One is not conscious that the boat of life is submerged under the weight of sins of life piled up regularly as the wooden-boat sinks under the weight of stones.

Thus, Sankaradeva succeeds splendidly in performing the dual duty of creating of popular literature on the one hand but through which elevating the cultural and intellectual standard of the common people on the other and which is the very need of a socialistic society.

323 Sankaradeva also composed in two new literary forms, viz., the Bargeet (devotional lyrical song) and the Ankia-Nat (one-act play). The Bargeets are far more poetical than the kavyas and more passionate than the akhyanas of kirtana and the Ankia-Nats which were based on sources from Bhagavad-Purana were written in Brajabuli diction (a mixed Maithili-Assamese dialect) inter-spersed with beautiful Sanskrit verses and their appeal was more oracular than visual like Shakespeare's dramas.

324 In such ways, the lofty sacred sastras, true to the first law, were made for use that revolutionised the old outlook of keeping the sastras cloistered in the 'Gurugriha' shrouded by abstract mystic ideas, written in the grand style of a classical tongue which was not spoken and understood by the common people. However, Sankaradeva closely adhered to the canons of the Sanskrit poetics and followed the classical traditions.

33 *Second Law and Neo-Vaisnavite Democratic Ideals*

True to the Second Law, i.e. "Books are for all", the emphasis was shifted from "Use" to the "User". Sankaradeva broke the seal of classical learning and made available its literature to the unlettered mass irrespective of class, caste, creed, sex and age, whereas the privilege of reading and interpreting them had hitherto been the virtual monopoly of the higher castes. Sankaradeva endeavoured to break down all prejudices of castes, creed and sex and elevate them morally and culturally. In many of his passages, he emphatically expressed that to obtain final release or to come to the presence of God one needed neither be a Brahmin, nor a sage, nor should one know all the scriptures. Vaisnavism preached by Sankaradeva was

democratic in spirit, principle and organization and all people could embrace it. For this very reason, Muhammadans and others including tribal people became his "Bhaktas" (disciples) who could participate in public religious services in leading roles.

331 *National Policy*

However Ranganathan's Message 43 under the *First Law in Library Book Selection*⁶ implies "censoring function" in use of books in public libraries which is also indicated in the context of quality vs demand. But, censoring function cannot be deduced from laws, rather it needs a philosophy of librarianship; the philosophy would naturally be moulded by the national policy. So also Sankaradeva while being true to the First and Second Law had been selective in the use of literature for the masses and was guided by his Vaisnavite philosophy of "Ekasarana Nama Dharna" (religion of supreme surrender and devotion in the name of One Paramabrahma). Thus, the Neo-Vaisnavite Renaissance was primarily concerned with moral and cultural upliftment of the users, there were by-products, no doubt. However, if Neo-Vaisnavite movement in course of time had adverse effects in different spheres of the society and the kingdom it is a different question.

34 *Third Law and Audio-Visual Means*

On the other hand, true to the third law "Every Book its Reader", Sankaradeva innovated various means and mediums in order to make the revolution as thorough as possible and supplement and compliment the emphasis on "use" and "user" of recorded knowledge. The institutional framework for his religion consisted of a network of "Satras" like medieval monasteries or Christian missions and each satra covering a network of "Namgharas" (prayer halls), attached to each village. The Namghara which was the central institution within the satra and central public hall in each village served as the platform for all religious, cultural, social and political activities of the community. There were regular chanting of the Kirtana-Ghosa, the Bhagavata and the Nam-Ghosa, congregational prayers with Bargeets, sung in classical ragas along with drums and cymbals. There were regular celebrations of festivals besides occasional religious and philosophical discourses

relating to sastras. All these gave a sense of participation and spontaneous involvement. During slack seasons of the year, occasional dramatic performance, i.e., "Bhāona" (performance) of the Ankia-Nats (or e-act plays) took place. The Sutradhara (the prologue) opens the Ankia-Nat by reciting verses and dancing in classical style with orchestra, introduces the character, announces their entrance and exit and fills up the lacuna in action of the play by song, dance, speech and brief discourses on ethical and spiritual points of the plot. The whole performance was accomplished in coordination and harmony of songs, dance, instrumental melody and dialogue; the whole story progressed in harmony of rhythm and dance in accordance to orthodox *Natyasastra* style. Besides, many of his kavyas were used in Ojā-Pali dance recital, a pre-Vaisnavite medium, when the leader of a group of four/five unfolded the story, repeated the refrain and the party took it along.

Thus, all these audio-visual performances were adopted in Satra-institution as "lure-effects" and "extension services" demanded by the third law and provided enjoyment to all breaking all social barriers. According to these processes, the common people were made acquainted with the episodes, characters, examples, maxims from the Epics and Puranas and thus gave an "Open Access" to knowledge and enlightenment stored in the lofty Sanskrit Sastras in an age when literacy was confined to the privileged few and learning was essentially aristocratic. The only exception is found that in "Barpeta Namghar" still ladies are not allowed inside.

"Bhāona" served as the most powerful agency for disseminating religious and ethical messages to the masses who had been deeply moved by the magic of Sankaradeva's verses, one century earlier than Shakespeare. The following passage speaks:

It is no mean credit to Sankaradeva that he collected villagers at Namgharas not to while away their leisure in hearing idle gossips but to listen to good poetry, ennobling music as well as to participate in philosophical and religious discussion.⁷

And the satra institution served as the most vital agency for continuing non-formal education of the community. "Madhupur Satra" in Kochbehar still witnesses grandeur of Sankarite culture. A scheme for establishing a Library-cum-Research

and Cultural Centre has been taken up by both Assam and West Bengal Governments jointly.

The namghara in course of time started serving as the village panchayat hall, where villagers gathered to discuss and solve many of their day to day problems presided over by the village elderly man. Thus, besides religion Namgharas worked for spreading Assamese culture and growth of social awareness. This gave birth to the culture of honouring the assembly of people irrespective of class and caste as greater than the individuals as well as the wisdom of an elderly man than the scholarship of a young boy. But this grip of the namgharas upon the society has lost its earlier strong hold as the sophisticated urban society is gradually coming out of its traditional fold due to changes in socio-economic and socio-political reality.

3^c Fourth and Fifth Laws and Continuing Activities

The activities and traditions of the Satra-institution were continued by the "Bhaktas" (disciples) quite satisfactorily for a long time. But ultimately, it could not adopt itself to the changing situation in the socio-cultural, socio-economic and socio-political necessity of the community and thus it has lost its earlier hold and impact.

4 FUNDAMENTAL LAWS AND NATIONAL FREEDOM MOVEMENT

4¹ Background

In consequence to civil war and Burmese invasion in Assam, there was a great set back in culture and learning during and after the Yandaboo Treaty in 1826 between the East India Company and the Ahom King. Numerous manuscripts must have been either destroyed or carried away by the invaders. The situation was aggravated when mothertongue Assamese was thrown out of the law courts, offices and schools (since 1836) and it was replaced by the Bengali language which was foreign. Assamese was however restored only in the year 1872. Fortunately, at that time the Christian Baptist Missionaries came with their religious mission. They volunteered their service and made their existence in Assam substantially by important contributions in cultural and educational life. The first Assamese printed book was an Assamese Translation of

the Bible in 1813 during Ahom regime. The missionaries could understand that unless they establish contact with the local common folk they could not spread their religious beliefs. Their primary aim was mass education. The Assam Baptist Mission in 1846 published the first Assamese printed magazine "Arunodoi" as monthly and which was very popular.⁸ They established schools as well along with churches, dispensaries and hospitals in addition to a number of government sponsored schools and colleges and a few libraries. However, this religious appeal could not break the local cultural armour which was already strong enough and so could not reach the masses except in hill areas. And, ultimately, their activities were shifted from the rural to the urban areas. As such, the impact of the messages behind the Five Laws was totally lost for the common people in this culture of literacy and education movement of the British time as it was not in conformity with the Assamese socio-cultural reality which was based on Indian culture that is oral.

42 *Resurrection of the Messages of the Laws*

The National Freedom Movement in India indirectly brings a consciousness for social awareness and education of the common people. Its indirect influence was the formation of the Assam Library Association in 1938 as an amateur endeavour by Sri Kumudeswar Barthakur who was a secondary school teacher. At the beginning, he made an attempt to build up a voluntary village library system through organization on the basis of districts in order to motivate the masses for library reading. He realized the motto that the pen is mightier than the swords. However, there were amusing stories how his group was once driven out by the people with sticks in hand while they attempted to speak in the market place as "stamp orator" in order to motivate for library use. He used all means for collection of fund and attracting people to the library meetings including offering tea.⁹ Although the attempt was in right direction, there were neither any supplementary agency nor any government effort to coordinate and regularize his attempt on permanent footing for re-orienting the rural folk by making them readers and benefit from use of books. Thus, the Association could not organize a regular village library service promoting use of books by the masses, and as such, all voluntary efforts

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fizzled out, and failed to make the full impact of the messages of the Laws felt in the society by the users

5 VIOLATION OF FIVE LAWS BY EXISTING LIBRARY SERVICE

51 *Public Library Service*¹⁰

After independence one Central Library in Shillong and seven District Libraries in plain districts of Assam were established under the scheme of Improvement of Library Service sponsored by the Government of India, Ministry of Education from 1952. At present, there are eight District Libraries, thirteen Sub-Divisional Libraries and one Central Reference and Research Library. A separate Directorate for Library Service is created in 1983-84. And consequent to creation of new districts and sub-divisions, upgradation of sub-divisional libraries into district libraries and expansion of library service to new sub-divisions are considered necessary. But the existing public library system could not develop an infrastructure of continuous network of libraries based on legislation or otherwise to reach each and every person of the community. The system also remains rootless due to its lacking involvement in community life in violation of the Five Laws and thus remains at a distance from the users.

52 Since 1981-82 the State Government has been giving matching grant to Raja Rammohun Roy Library Foundation, Calcutta for implementation of the projects "*Books for the millions at their doorsteps*" and "*Preservation of rare and valuable books and other reading materials*". The amount is utilized in purchasing books and in binding and preservation of old and rare books, magazines, etc., of the government libraries and voluntary institutions.

53 *Rural Libraries*

During the First Five-Year Plan, some voluntary libraries were receiving good financial assistance under the Block Development Projects, but which afterwards decreased considerably. The voluntary rural libraries established by social workers were receiving meagre financial grants occasionally for books from Social Education Deptt.¹¹ which was functioning till 1970-71. They were not brought under the regular programme of the government public library service. It is found that the rural

libraries which were coordinated with a regular "Namghar" (prayer hall) and other social and cultural clubs are continuing while the rest already disappeared. These rural libraries were used as social education centres for the users and did not emphasise much on library's primary aim to convert the non-readers into readers. However, some "lure effects" and "extension programmes" were used although not systematically according to messages of the laws. There are instances of many rural libraries joining in adult education programme, village development work, cultivation programme and poultry farming in order to raise fund. Sometimes they do give loans also to the poor in need. These library clubs organize theatres, variety shows, sports and plays, debates, discussions, etc. Thus, these casual rural library clubs, consisted of voluntary efforts could integrate into the social and cultural life of the rural folk; but these casual efforts are not the results of coordinated, uniform, regular and systematic efforts made on the basis of study and research in order to provide scope for continuing education to mould the users to desirable ends.

54 *Rural Library Complex*

At present, a village library scheme has been taken up during 1984-85 and it will continue during the 7th plan period to achieve the target of establishing 714 rural libraries covering all the existing Gaon Panchayats of the plains districts. The scheme will cover 22,000 villages. As there are no Gaon Panchayats in Hill areas, the scheme will be implemented in block level, i.e., seven blocks in Karbi-Anglong districts and two blocks in North-Cachar. Village Library Advisory Committees will be constituted to advise the government for development of rural libraries. The entire scheme will involve rupees one crore.

541 There is no project for construction of rural library building at present. The existing rural libraries will be taken over by the government; staff, books, newspapers, magazines and furniture wherever necessary will be provided for. Now, it is to be seen if these rural libraries with regular and systematic support would be able to absorb the social and cultural content of the voluntary rural clubs which have involvement into the community life in order to develop an effective multi-purpose rural library system organically true to the messages of the Five Laws.

55 Library Services in the Char Areas

During the 7th plan period, thirty-five libraries are proposed to be set up in the selected "Chars" (riverine areas of the Brahmaputra) mostly inhabited by migrants in order to develop the social and academic life of the people.

56 Adult Education Programme

561 The National Adult Education Programme (NAEP) was launched in October 1978 during Janata regime as a nation-wide campaign. It aimed at functional literacy and social awareness of the people mainly in the age-group of 15-35 in about five years time in coordination with activities of different agencies. In Assam, under Adult Education Programme, some officers like project officers have been created under the Additional Director of the Department of Education. Many Adult Education Centres under National Service Scheme have been established. The implementation is however, nationally subjected to wide-spread criticism.

562 During 1982-83 the Scheme was revised by the Congress Government in light of the provisions of the Revised 20-point programme as well as the minimum needs programme. Point No. 16 of the new 20-point programme relates to the spread of universal elementary education for the age group 6 to 14 with special emphasis on girls and simultaneously involves students and voluntary agencies in programmes for removal of adult illiteracy¹². Although, no targets have been fixed for the plan period, the plan document envisages coverage of entire adult illiterate population in 15-35 age group by 1990. Thus, it is heartening to note that the objective behind all these programmes of non-formal education is to ensure a free, lifelong effective and meaningful continuing education system and universal elementary education in a truly socialistic pattern of society. But it is doubtful if the existing infrastructure in Assam could be able to ensure a regular follow-up action.

6 RELEVANCE OF FUNDAMENTAL LAWS IN THE NEW EDUCATION POLICY

61 Background

There are at present eighteen districts with an estimated population of little more than two crores (no census was held in

1981). In 1971 against All India literacy of 29.45%, Assam's literacy was 28.15%, out of which 36.68% was male and 18.63% was female. More than 90% people live in rural areas in Assam. According to 1981 census the All India literacy is 36.7%. In Assam, the population is a heterogeneous group consisted of plains people, hill tribals and plains tribals, tea-garden labourers, migrants and non-Assamese domicileds. No group may be said to be dominating. But no correct statistical figure is available. The area consists of 78,523 sq. miles, primarily of plains except some hill areas.

62 Broad Education Policy vs. Multi-purpose Public Library System

The Soviet Union's launching of war against illiteracy and its achievement of almost universal literacy for the age group of 18-35 years within a span of ten years was made possible by broad national education policy declared by the Council of Peoples Commissars (ministers). Lenin, as its chairman signed the historic decree for eradication of illiteracy in December 1919.¹³ This broad education policy was consisted in principle and practice of each and every public agency for coordinating in the most extensive and comprehensive education programme. Besides all general, technical, vocational schools, colleges and universities, it included printing and press, all types of reading materials, all libraries, all audio-visual means of mass-education, different agencies for amusements like theatre, movie, circus, playground, clubs, museums and different social and cultural organizations including volunteer corps, oral teachings, etc. Literature, music, art and painting, science, intellectual and philosophic discourses were employed for mass education. Soviet Union nationalized all educational institutions and made each and every person of the office, industry free for a limited period and when the literate will teach and illiterate will learn during the time. And all the follow-up work was carried out by a very well-organized library system.

The proposed National Education Policy of our country can take the example of such a broad education policy. And it is only a well-unit multi-purpose public library system true to the Five Laws that could coordinate and integrate all aspects of formal, non-formal and informal learning as well as follow up programmes for the cause of use and user. This could present a

nucleus agency for establishment of a network infrastructure in order to achieve the national objectives of non-formal life-long processes of learning meant for the masses. The model of the processes centering round this nucleus may be designed from the examples set by Neo-Vaishnavite Renaissance in Assam, which were developed centering round a network of "satras" and "namgharas"; but it must certainly take advantage of the existing public and private popular agencies like moving theatre, T.V. and Radio broadcasts, rangharas, political and non-political clubs, etc., characterized by flexibility, inter-sectoral cooperation and inter-agency coordination. But the contents for use and user are to be designed by various teams of heterogeneous experts. Such processes and contents are to be organically and meaningfully integrated into the functions and operations of the multi-purpose public library system and which are to be woven into the very texture of life-pattern of local socio-cultural, socio-economic and socio-political reality of the community with a growing tendency towards a pragmatic society of the present day world. These would bring an involvement of the users. The context while satisfies the existing demands of educational and developmental needs is also to elevate the standard of different demands and thereby create further demands from the users and thus give chance for spiral upliftment in all aspects.

63 National Open University vs. Public Library System

The bill for opening the Indira Gandhi National Open University in the Capital had been adopted by the Lok Sabha on August 26, 1985. The objective of the bill is to provide an innovative system of university level education by a generous use of mass media of instruction. It would be non-formal, non-traditional, functional education from a distance to those home-based working people who are unable to pursue learning as a whole time occupation. The jurisdiction would be through out the country.¹⁴ The system appears to be a linkage between formal and non-formal education system. This would be in the model of British system of Open University based on Milton Keynes in Buckinghamshire which teaches through a multi-media system involving correspondence, tuition, television and radio broadcasts, contact classes and face to face meetings. It is an integrated use of all possible systems of teaching at a

distance. It does not have academic entry requirement. It is a very recent, unorthodox highly exciting innovation.

This system would require a network infrastructure for contact classes, local viewing centres, publicity, etc., and which could be provided by a network of multi-purpose public library system as a viable unit. But a note of caution is desirable in the context of existing circumstances and conditions that without the proper infrastructure both physical and functional, it would be an another failure as usually happens in India.

64 Conclusion

The messages of the Five Laws are thus found to be extremely relevant in order to achieve the national objectives for ensuring an effective and meaningful non-formal continuing education on the basis of involvement and examples than lectures and precepts, and which could be achieved through a proper development of a multi-purpose public library system. The objectives behind all these planning aiming at a truly socialistic pattern of society are implicit in the philosophy of Ranganathan's Five Fundamental Laws of Library Science. The proposed new Education Policy should look into the matter seriously.

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1.3 Contributions of Ranganathan and World Librarianship

P.N. KAULA

Tracing the enormous contributions of Ranganathan, the paper describes their significant impact on world librarianship; Elaborates the philosophical approach and fundamental contributions of Ranganathan in classification and cataloguing and how countries like Britain and USA have recognized, adopted and made use of his ideas and techniques. International organizations like IFLA were also deeply appreciative of the work of Ranganathan in many areas of library science and documentation. In explaining the impact, the views and opinions of many leading experts in the field are quoted. The paper narrates also the impact of Ranganathan's contributions in bibliographical work. Ranganathan's contributions to the library profession as a teacher and education, effective communicator, total dedication, scientific method of application, library administration, standardization, etc., are highlighted. Ranganathan's work in IFLA and other world bodies are mentioned. The honours and awards received by him and the rich tributes paid to him by world personalities and his own disciples in India are enumerated.

0 INTRODUCTION

Another opportunity for analysing the work of Dr S R. Ranganathan and to examine the impact of his contributions has been provided by the Indian Library Association. It was at the World Congress of Librarians held at Brussels in 1977, I had raised the issue of holding an international seminar on Ranganathan under the auspices of IFLA. As a panel speaker on Education and Learning, I mentioned that Unesco should provide funds for such a seminar when organized by IFLA. This suggestion was welcomed but no action could be taken subsequently.

I discussed this matter with Mr Girja Kumar, President, Indian Library Association in March, 1984. He readily agreed to convene this conference. I am, therefore, expressing my

gratitude to ILA President for taking all pains in organizing this conference. I am sure that a number of papers presented to this Conference would evaluate the work of Ranganathan. But there would be very few papers that would present the impact of this contributions to World Librarianship.

1 ENORMOUS CONTRIBUTIONS

Ranganathan had written profusely during his career of nearly five decades (1924-1972). Besides writing 50 books he has over 1,000 articles and scores of library development plans to his credit. The number of publications Ranganathan had written is enormous. He had written on almost all aspects of library science. He founded and edited three research periodicals on Library Science filled mostly with his own contributions. It is, therefore, difficult to determine the significance of each of his contributions.

1.1 Significant Impact

Ranganathan is recognized as the Father of Library Science in India for he built up the science, the philosophy, practice and the programme by himself. His influence on World Librarianship had been of varying degree. While this impact has been more significant in the work that emanated from UK but it has not been so in USA. In the international field his work with FID had been more significant than his work with IFLA. But the major impact of Ranganathan's ideas had been in the field of Classification and Indexing.

2 IMPACT ON CLASSIFICATION AND INDEXING

In the field of classification, Ranganathan's contribution has been the dynamic theory he propounded and its projection through analytic-synthetic pattern. *ALA World Encyclopedia* mentions that Colon Classification which Ranganathan designed, in spite of its infrequent use, has had a major impact on library classification affecting all the existing or newly revised schemes.² With the formation of CRG, London in 1952, a number of specialised faceted classification schemes have been designed and developed. Faceted classification principles have been used in arranging the entries in

the *British National Bibliography (BNB)*. Its principles have been used in subject heading systems both of BNB (1950-1971) and in BTI (British Technology Index). Its principles are also used in Thesaurafacet.

Preserved context (Indexing) System (PRECIS), the indexing system devised by Derek W. Austin for use in BNB, also owes much to Ranganathan's influence. It is very difficult these days to devise a generalized classification scheme. But whatever schemes have been devised through collective efforts in recent years, they are based on faceted classification principles. Two such schemes which allow the combination of subject sub-divisions according to faceted classification principles are the USSR's Bibliothecal-Bibliographic Classification Scheme (BBK) and Broad System of Ordering (BSO) commissioned by Unesco under UNISIST programme.

3 IMPACT ON CATALOGUING

Ranganathan had contributed several original ideas in cataloguing and Indexing. Apart from enunciating principles, canons and designing precise terminology, the process of Facet Analyses has been found extremely useful in generation and organization of a controlled vocabulary of any type (Lancaster). According to Vickery it is measure of the extent to which Ranganathan's ideas have penetrated the theory and practice of indexing. We can distinguish three basic contributions in cataloguing that had world impact. These are:

1. *The Principle of Synthesis*: The representation of subjects by combining terms, the meccano as he used to call it.

2. *The Principle of Facet Analysis*.

3. *The Symbiosis Principle*. The basic principle introduced by Ranganathan and perhaps the most important of these principles is symbiosis between Classification and Catalogue or index. This interlinking of class number with subject headings can occur in many ways. These are the following:

- (i) In providing a detailed alphabetical index to Classified catalogue as is done by Chain Procedure;

- (ii) Using classificatory analysis to develop an alphabetical index such as PRECIS; or

- (iii) In constructing an integrating thesauri-facet vocabulary for indexing.

Eugene Garfield while accepting the major impact of Ranganathan on classification has analysed his other contributions separately. According to him over 400 publications have cited Ranganathan's work over a 20 years period. He further says (for a number of reasons, these citations are only a fraction of what a thorough search would establish). He had acknowledged Ranganathan's contributions by including his portrait in mural at ISI entitled 'Cathedral of Man'

Several years ago when I was on Unesco assignment in Cuba, I came across a paper in Spanish by Georg Aguayo who had ranked Ranganathan's contribution to Library Science to that of Einstein in Physics. Dr Garfield has also mentioned: "Ranganathan is to Library Science Einstein is to Physics"

4 IMPACT ON BIBLIOGRAPHICAL WORK

Ranganathan's influence on bibliographical work has been significant. He initiated the value of classified bibliographies rather than the traditional alphabetical ones. He published the Union Catalogue of Periodical Publications in South Asia⁶ with entries arranged in classified sequence. The *British National Bibliography* under the editorship of A.J Wells adopted Ranganathan's techniques when it was published in 1950.

Wells stated:

BNB was based on Ranganathan's theories . . . We decided to take his principles and to work them out using the Dewey Decimal classification as our base.

Wells further states :

Following our success, Ranganathan's work became the basis, not only for the *British National Bibliography* and for the *Indian National Bibliography* shortly after, but for the *Ceylon National Bibliography* in 1962 and in 1967 for the *Malaysian National Bibliography* and the *Singapore National Bibliography*—all using the Dewey Decimal classification, with featuring and Chain Index. A Chain Index to the *Canadian National Bibliography* (Canadiana) is maintained as an in-house subject index.⁷

5 IMPACT ON PROFESSIONALIZATION

51 Impact on Teaching of Library Science

Ranganathan worked for the library profession all his life. He worked tirelessly to professionalize library science education in India. He started the first library school at Madras, drafted the first syllabus which was adopted by all other schools of library science in the country. The first advanced training programme and even doctoral programme has been due to his vision, conviction and advocacy. There are instances when he had to face hostile attitude from his contemporaries some going to the extent of saying that he had moved from a single dot (decimal) to double dot (colon) and did that require some research to earn of Ph D ⁸

But it is a fact that he set up an example in teaching of library science, its contents of courses and in the methodology of teaching. Many in the profession could not understand the need for teaching universe of knowledge and its link with the study of classification. Langridge introduced Universe of Knowledge paper at the College of Library Science, University of Maryland. Thelma Eaton wrote on the influence of Ranganathan's ideas in the teaching of library science in American Library schools.⁹

Another study¹⁰ revealed that of 48 schools accredited by ALA, 73 per cent (35 schools) include faceted theory in their curricula. But only 20 per cent (7 schools) followed in depth. It further revealed that although 50 per cent of the schools include Colon Classification in their curricula, only about 8 per cent (2 schools) conduct practical exercise in it.

52 Effective Communicator

Fosket (DJ) while analysing the most precious elements of professionalism in Ranganathan, had stated:

"He had, I think, an infinite capacity of taking pains which has been defined as the basic element of genius. He had also an infinite capacity for communicating with anybody. He was to my mind, one of the pre-eminent communicators of what we understand by library and information services today."¹¹

Garfield observes that "Ranganathan's activity level throughout his life-time reflects a total selfless commitment to library science."¹²

53 Total Dedication and Scientific Method Application

Those of us who had the good fortune of working with Ranganathan saw him breathing library science all the time. He remained actively engaged in research till his death in 1972. This total dedication to the subject what he called "work-chastity", was unique. His self-abnegation and devotion was grounded in a deep spiritual perfection. We were amazed to see the tremendous will power and the powerful concentration of his whole body at work under odd circumstances.

Langridge states:

Ranganathan was not himself a mystic. He was an intellectual who absorbed much from the west and outdid us all in the application of scientific method to librarianship.¹³

54 Impact of FID

Ranganathan shot into international fame in 1948 when Donker Duyvis, Secretary General of FID invited him to FID headquarters in the Hague and got his memorandum published as "Classification and International Documentation" as a fascicule of *Revue de la Documentation*. His influence in FID increased when he was made Rapporteur General of FID/CA (Committee General Theory of Classification) and later Hon Chairman of FID/CR. (Committee on Classification Research). Ranganathan submitted ten reports to FID as Rapporteur General of FID/CA (1951-61) and brought into international field his concepts of Fundamental Categories, Facet Analysis, Sector Analysis, Zone Analysis, Common Isolates, Phase Analysis, Systems, Specials, Environmented Classification, etc. FID honoured him by making him an Honorary "Member of Honour" in 1957. The Citation honouring him read:

In commemoration and honour of his many important contributions to library science and his creation of the Colon Classification, as well as his multiple activities in promoting the intellectual and cultural cooperation between the Eastern and the Western worlds

55 Impact on Other International Bodies

Ranganathan was a prominent member of the first Unesco conference on Public Librarianship and was also an influential

faculty member of International Library school held in Manchester in 1948. He was a member of the International Advisory Committee of Library Experts of United Nations which laid down the policy for the establishment of the United Nations Library. He served on Unesco's International Bibliographical Committee from 1950 to 1953. He was invited by Unesco to work on application of classification to automation.

56 Impact on Standardization

Coblans regards Ranganathan as "one of the great apostles of standardization."¹⁴ He further says :

Ranganathan's prose style certainly has some strange characteristics . . . His books and writings have systematic rigour and are cast in the logical framework of a system . . . He had a real gift of using words creatively.

English was not his mother tongue and Coblans says "to ordinary English words to which he gave extraordinary meanings, we sometimes forget that we owe to him."¹⁵

57 Impact by Lectures

Ranganathan's contributions were acknowledged internationally. He played a prominent part in world Congress of Librarianship and Documentation in Brussels in 1955. He was invited to lecture in several countries. These included Denmark, Germany, GDR, Japan, Poland, UK and USSR.

58 Component Jobs in Library Work

Ranganathan has written a book entitled *Library Administration* in 1935. It is amazing how he has made a break down of library work into about 10,000 component jobs. Garfield observes that by precisely identifying different library functions, Ranganathan was able to simplify and streamline library routines. This no one else had done. This is all the more necessary when we are shifting to computerization in libraries all over the world.

6 HONOURS AND AWARDS

In 1964 he was conferred the Honorary D. Litt. degree by the University of Pittsburgh.¹⁶

In 1970, Ranganathan received the Margaret Mann Citation in Cataloguing and Classification of the American Library Association. At home he was awarded "Rao Sahib" and "Padma-shri" by the Government of India, and Honorary D. Litt. by the University of Delhi (1948) and was made National Research Professor in Library Science in 1965.

The two volumes of *Ranganathan Festschrift*—volume 1 containing contributions from all over the world and edited by P.N. Kaula¹⁷ give a measure of the stature that Ranganathan had achieved in International Librarianship. His 71st birthday was celebrated internationally as well. The felicitations revealed from all over the world have been edited and published by P.N. Kaula.¹⁸ Some of them are worth quoting in this article.

The American Library Association paid tribute to Ranganathan in the following words:

"S.R. Ranganathan—*Librarian to the World* on behalf of the cataloguers and classifiers of America we greet you.

"Yours words are the words of the Anglo-American, but your language is the language of the East and your ideas are universal. You answer the challenge of the future with a challenge. Most of us are not your disciples; all of us are your students. For a generation you have forced librarians to think. We are proud to be in your debt."¹⁹

Dr Alexander King, the then President of FID states:

"In the evolution of the discipline of librarianship to the level of real science, Ranganathan has been a pioneer and it is in this sense particularly that we honour him."²⁰

Prof Seymour Lubetzky acknowledges the debt that he owes to Ranganathan in the following words:

"When I read Ranganathan's criticisms of our rules (of cataloguing) I began to realize that, great as their contributions have unquestionably been, the founders and framers of our cataloguing rules may not have foreseen everything and their being quite infallible, and it seemed increasingly clearer to me that it would sometimes be necessary to stop and reconsider our rules, to discover their underlying principles which have proved sound and valid throughout the years, and to reconstruct our rules on the basis of such principles. And for this guidance, among others, I am indebted to Dr Ranganathan."²¹

7 WORKS ON RANGANATHAN

There are works on Ranganathan which depict his life and work. Apart from *Ranganathan Festschrift* in two volumes which were initiated by P.N. Kaula, there are books written by A.P. Srivastava and M.P. Satija. Srivastava has analysed the pattern making of Ranganathan in International Librarianship. He observes:

"Ranganathan used the techniques of analysis, synthesis, chain procedure system, specials, etc... His 'Five Laws', theories and numerous writings mentally and academically prepared the Library World to study and entertain information science which emerged after the Second World War."²²

Satija has his own style of writing. He has observed:

"No evaluation of his (Ranganathan) style or works or anything akin to these can pretend to be just and fair without keeping constantly in mind his copiousness as a writer. Ranganathan entered the profession without any prethought, background or inspiration, when past thirty and his first professional writing came out in 1928—the 5th year of his entry into profession. Had he chosen his career at the normal age, perhaps the things would have been different, not with him but with us too. But there was no profession in Librarianship in India till Ranganathan *made it*. In spite of this up to 1961, Das Gupta's bibliography on Ranganathan enumerates his 1,105 writings. Now the score of his writing estimated to be near about 60 books and 2500 article."²³

Library Science Today Volume 1 of Ranganathan Festschrift presents an evaluation of Ranganathan's life and work. Two special Numbers of the *Herald of Library Science* edited by P.N. Kaula are devoted to Ranganathan^{24, 25}. "Ranganathan and his Impact on World Librarianship" is included in the Ranganathan Memorial Number Vol. 12, 1973, pp. 219-231. It covers the tributes paid to Ranganathan in the world press.

It is not possible to give even the extracts of what have been published. Readers of this article will feel benefitted by reading these 13 pages. They bring out in totality the greatness of Ranganathan as a giant figure on the international scene. Kaula had already acknowledged him as the "greatest of the giants" the world has produced in our profession.²⁶

The Library Association London has published a bunch of

six papers presented at a Memorial Meeting held in London on 25 November 1973 to pay homage to Ranganathan. Mr Joel Downing mentions in the Foreword to this book:

This meeting is in memory of Professor Ranganathan, a vice-President and a Fellow of the Library Association, and shows the great respect of the profession for one who made the most significant contribution to Librarianship and information studies during this century. Ranganathan died four months ago in Bangalore. . . after a life-time of devoted work to the interest of Library Science, not only in his own country but throughout the world.²⁷

Ranganathan worked till the very end of his life. New thoughts came to him as leaves to a tree, which hand and brain went every paired, questions Roberts Browning rhetorically. Were it so, Ranganathan's writings would have been perhaps ten times more, estimates Satija. Ranganathan was conscious of the paucity of time at his disposal. Jayarajan, his research assistant till his last days mentions:

"Ranganathan's mind was always in tension especially during his last one year. He very well knew that there might not be much time for him to live and everything was coming to close and a lot is to be done. He wanted to revise *Colon classification*, rewrite *Library Administration*, draft Librery bills, write articles, give recorded speeches and teach young librarians. His mind was all vigour; but body deteriorating day by day. He worked and worked very hard till the end of his journey."²⁸

8 IMPACT THROUGH WRITINGS

The man dies but the thoughts live on. It is true in the case of Ranganathan too. The works of Ranganathan have to be revised, edited and published. While he was alive he managed to find time to write a spate of books and articles on every aspect of librarianship from the simplest clerical library routines to its philosophy and theory. Many works propounding his theory and ideas have been published from UK by members of CRG who understood Ranganathan and his impact on World Librarianship. The writings of B.I. Palmer, A.J. Wells, D.W. Langridge, B.C. Vickery, D.J. Foskett, E.J. Coates, J.

Mills, Barbara Kyle and J.E.L. Farradana, all speak volumes about Ranganathan and his contributions.

From USA there have been specialists who have interpreted Ranganathan and his works. These have been led by the giant among them — Dr Jesse H. Shera. Shera was a great admirer of Ranganathan and had understood the impact of his contributions. He had named Ranganathan "One-man Library Movement" and had lamented the less response from American librarians to the study of his philosophy and work. That he said was due to their having more faith on the logic of the alphabet rather than on ordinal numbers.

Shera while appreciating the seminal contributions of Ranganathan had said:

There is much more substance in Ranganathan's writings than most Americans have acknowledged and we plead only objective evaluation of his work.

A century after the death of Moliere, the members of the French Academy attempted to make amends of their neglect of hingenius by engraving below his statute.

Rien na manque a sagloire; il manquait a la notre

"American Librarians might well write a similar verdict across the shelf of books that bear the authorship of Ranganathan."²⁹

Coblans mentions "We shall greatly miss Ranganathan but he remains a contnuing reminder"³⁰ endorse it with our felings. In 1975 Eric de Grolier said at the Third International Conference on Classification Research held in Bombay in 1975 that Ranganathan was the 'Guru' of us all. That sums up his impact on World Librarianship".

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1.4 Ranganathan's Search for a Normative Base in Librarianship

ANIS KHURSHID

Shiyali Ramamrita Ranganathan (1892-1972) as we look at him today was stammerer and a patient of some chronic disease in his early age.¹ He started his career as an Assistant Lecturer in Mathematics in the Government College Managlore in 1917 and founded the Mathematics and Science Association of that College. He worked hard for raising the status of the college teachers in South India to the point of strained relations with the authorities; so much so that he was advised by his friends to apply for the post of university librarian at the University of Madras which was advertised in 1924.² He was selected for that post and thus a mathematics teacher was forced by his circumstances to take up librarianship of a university library then in the making in South India. His appointment to this post required a year's study in the University College, London where a postgraduate diploma course in librarianship and archives was started in 1918. He studied there under a non-degree programme with an apprenticeship in the Croydon Public Library under the guidance W.C. Berwick Sayers (1881-1960). He also visited 100 other public libraries in Great Britain during this study programme.

This exposure to the vocation of librarianship, in the British Setting, where the Central Library for Students established in 1916 was in the process of development as the National Central Library (NCL), which was destined to play much larger influence in library cooperation in later years. (The present British Library Lending Division (BLLD) is the result of this cooperation). Ranganathan was struck by the "bewildering variety in the practices of libraries. . . not to the result of purposeful variations in all cases, but to the unintended ones due to drifting along without a normative force".³ He was also critical of the School of librarianship and Archives "for its lack

of coordination and for the disjointed way, in which information was presented [in the class]"

The absence of a normative force in librarianship, the vocation which Ranganathan had selected for himself, was looming large in his searching mind when he returned to India to join his duties as librarian of the Madras University Library. Then, in the United States the Williamson report⁵ in 1929 had expressed dissatisfaction over the un-uniform standards of library science programmes which had by that time fairly grown in their influence on the American library scene. His recommendations, which in later years changed the course of library education in the United States were receiving due attention. In Great Britain, a stage was set for far-reaching changes in public library system of that country as a result of the report of the Public Libraries Committee in 1927⁶. In India the Calcutta University Commission report⁷ defining academic status of a librarian and the functions of a library committee in a university without any ambiguity had begun to produce its impact on university libraries; the Punjab Public Library opened in 1884 in Lahore had assumed the function of a central library in 1929 for Northwest India comprising the former Punjab, the princely states adjoining it and the Northwest Frontier Province,⁸ on the recommendation of the All-India Conference of Librarians held in Lahore on 4-8 January 1918. The All-India Public Libraries Association founded in 1920 had started publishing *Indian Library Journal* in 1924. The Punjab University course, started by Asa Don Dickinson in 1915 was in progress with an enlarged syllabus suited to the peculiar library situation in India.

On the international level, the International Federation of Library Associations and Institutions (IFLA) was yet to be founded. So was the case with the International Federation for Documentation (FID) but its originator, the *Institute International de Bibliographie* founded in 1895, had done useful work, by 1924, in the development of Universal Decimal Classification (UDC) and Universal Bibliographic Repository (RBU).

But these developments had not provided any normative base to librarianship. To this and, therefore, Ranganathan's mathematical mind devoted attention to find an answer to the

question: Why librarianship? From Jesse H. Shera (1903-1982)⁹ to J. Periam Danton to Leon Carnovsky (1903-1975) each attributed the lack of a philosophy in librarianship, as the foremost cause which had resulted in the professional crisis. It was Ranganathan, however, who in 1931 promoted for the first time a philosophy for librarianship called the *Five Laws of Library Science*,¹⁰ which include:

- 1 Books are for use
- 2 Every reader his book
- 3 Every book its reader
- 4 Save the time of the reader
- 5 Library is a growing organism.

From the formulation of these laws in 1931 to date a number of changes have taken place in the professional of librarianship but the validity of these laws still remains unchanged. Two conceptual elaborations, however, were made by Ranganathan himself in the 1965 edition of the book containing these laws. One refers to the generalization of 'books' to include 'documents' recently being emphasized in the work of 'documentation'. The other refers to the term 'growth'. Initially this term was used in the sense of child 'growth' involving steady increase in the overall size of a child. This concept did not recognize the existence of conserving libraries. For this reason the original concept was changed by him to include the concept of growth by replacement of constituents without increasing the overall size.

These laws, according to Shera¹¹ harmonizes with the American concept of service. He [Ranganathan] has said in effect, that the function of the library, is to maximize the utility of graphic records for the benefit of society." Danton¹² criticises the failure of these laws to "define the functions of library activity on any other basis than that of present-day good library service; the discussion is not an open ended inquiry into the validity of functions and activities. Most of all it is further limited to public library work." E.J. Reece¹³ on the other hand looks into the place of library in and its influence on the society, as part of a philosophy for librarianship but is hesitant to consider them as components of a philosophy

because of their being too practical. A. Robert Rogers tracing the search for a philosophy from Arthur E. Bostwick's "The Love of Books as a Basis for Librarianship" (1907), refers to Ranganathan (1931) remarking:

From very different social structure and philosophic tradition S.R. Ranganathan of India begins to articulate principles of librarianship in the 1910s (Sic., 1931) that embraced the entire role of the library in society in a fashion more systematic than any hitherto attempted. His five laws of library science has a deceptive simplicity.¹⁴

Rogers then speaks of the question raised by Danton as to the ideals and purpose of the society to which library provides services which was already pointed out earlier.

How best the place of the library in the society can be made part of these laws. Could we enlarge Ranganathan's *Five Laws of Library Science*, as suggested by the author, by opening them with this addendum." Library is an educational, scientific and cultural institution in the society."¹⁵ The scientific part of it is borrowed from Unesco to mean 'scientific humanism'. The relevance of culture to special libraries may, however, be questioned but even the activities of research institutions of which these libraries are part are directed to the advancement of culture and civilization and as such special libraries also contribute to their development and are very much promoters of culture. Or, as David Reith would have it, the library is a communication agency in the society.¹⁶

These laws are central to the various principles that Ranganathan divided in his other significant works, and thus the disjointed way in which he found various library activities, being performed separate from each other, are now interlinked, through his principles, to achieve the ultimate goal—Books are for use. Unesco also used "Books for all" as a theme for its International Book Year—1972 (IBY—1972) celebrations, the world over.

Sayers¹⁷ under whose watchful eyes Ranganathan received his early training in librarianship thus says about his writings:

The teacher in him was accompanied by an urge to write of his experience, experiments and speculations; so much so

that he set out apparently to rewrite the whole of librarianship, first in terms of Indian necessities and to instil the library idea into countrymen not well aware of them and gradually to promulgate his theories as a world basis; he became in consequence the most prolific writer on the subject.

The Colon Classification(CC)¹⁸ when first published in 1983 aroused both enthusiasm and severe criticism which no other bibliographical classification has done so.¹⁹ India also did not have a soft corner for this scheme as would appear from the criticism made on it published in the Indian Library Association's official organ *The Library Bulletin* during 1943-45. Sayers, says about this classification system, "... no matter what our opinions ... may be, its influence cannot be ignored. Indeed, if one is not positively hostile towards the scheme, it may be regarded as the greatest stride forward, with regard to the principles of bibliographical classification, in the nineteenth century".²⁰

Shera and James W Perry says, "of all librarians only S R. Ranganathan has attempted to build a bibliographic classification upon epistemological principles. By demonstrating the ways in which knowledge grows ... he has clearly shown the relation between bibliographic classification and the patterns of man's cognitive growth."²¹

Ralph R. Shaw,²² speaking of Colon Classification as the one which has opened minds, says "the Meccano technique of synthesis ... is one of Dr Ranganathan's contributions which led to the burgeoning of the synthetic approach." The present schemes including the ones for computer searching have thus their roots, according to him, in this Meccano philosophy. According to K.K. Olding, "A whole school of thought has developed embodying the principles of classification first laid down by him (Ranganathan)."²³

Maurice F. Tauber and Edith Wise²⁴ surveying the literature on classification systems, thus remark about CC "Undoubtedly Ranganathan has achieved more in altering librarians generally to the limitations of existing classification than attracting general use of his system."

Ranganathan has written a number of books on classification and introduced therein a variety of new terms. A large number of these terms are now part of standard vocabulary of modern

classification theory. H. Coblans,²⁵ speaking of his gifted ability of using words creatively, refers to such terms as 'depth classification,' 'micro-thought', 'facet analysis' which are now used with new meaning and depth in modern library literature. He refers to depth classification and 'facet' which are frequently used in Information Retrieval (IR). B.C. Vickrey also²⁶ speaks of 'facet' in this contest.

Speaking of the books on classification Sayers²⁷ commended the *Prolegomena to Library Classification* (1937); *Library Classification: Fundamentals and Procedure . . .* (1944); *Elements of Library Classification* (1945); *Classification and Communication* (1951); Vickrey²⁸ speaking of *Prolegomena . . .* refers to Ranganathan's 'meccano' principles which were formulated much before the introduction of the idea of 'coordinating indexing.'

Ranganathan was vigorously opposed to the alphabetical arrangement of catalogues and strongly believed that "sharpness of thinking, clarity in expression, expedition in response and exactness in communication depended ultimately in the deliberate exercise of the inner power of classification."²⁹ The distance between the alphabetical and classified arrangements continues to widen on a larger scale with the explosion of information. But the principles of "sympiosis", first introduced by Ranganathan, in his works, for interlinking these two systems has helped to resolve the conflict between the two. Vickrey³⁰ regards this as "Ranganathan's most important contribution to indexing, it exemplifies the characteristic found in all his works—his ability to see the many-sided connections of each phenomenon in information transfer. In current jargon, we might call it the systems approach."

These principles were, however, neither developed in the context of the Colon Classification and nor in India but they were used by the *British National Bibliography* in 1950 in the context of the Dewey Decimal Classification (DDC) used by it. Modified to the BNB needs these principles have had considerable influence in the successful structuring of 'features' and 'chain index' in BNB. So much so that the *Indian National Bibliography* borrowed it in 1958 and the *Ceylon (now Sri Lanka) National Bibliography* and the *Pakistan National Bibliography* followed it in 1962; the *Malaysian National Bibliography* and the *Singapore National Bibliography* in 1967. A.J. Wells³¹ therefore

calls Ranganathan's influence on the Indian National Bibliography as an indirect influence. Speaking of the Preserved, context Index system (PRECIS) developed at BNB, he says, "The end result of this system may be different from what Documentation Research and Training Centre (DRTC) at Bangalore is working at, but without the insight provided by Ranganathan, through his principles, this development would not have been possible at all."

Ranganathan also wrote a number of books on cataloging and like the other works, discussed earlier, he formulated a number of principles based on his *Five Laws of Library Science*. The most important of these works is the *Headings and Canons*. . . (1955) which provides an stimulating comparative study of various catalogues. K G B. Bakewell³² regards it the second best book after Semyour Lubetzky's *Cataloging Rules and Principles*. . . (Washington, 1953). The development of Cataloging. In Publication (CIP) in the recent years has also its root in Ranganathan's pre-natal cataloguing.³³

There is hardly any subject concerning librarianship on which Ranganathan has not written anything. He is the greatest library author who has contributed greatest number of books on almost all the subjects on librarianship. There is however one subject, library education, which is not directly covered in these books to which the author had made a reference to him in 1963 in Bangalore at the time of the presentation of the September-December 1962 issue of the *Pakistan Library Review* dedicated to him on his 71st birthday celebrations. The author had then requested him to treat this subject exclusively in one of his later publications. He did write a report, *Library Science in Indian universities* (1965) for the University Grants Commission of India but that was more of a report than anything of the characteristic found in his writings.

Even his book, *Library Administration* (2nd. ed., 1960) contains a staff formula which reportedly aroused interest in the United States when a lady librarian of a special library spoke of the formula in one of the section meetings of the annual conference of the American Library Association. She narrated the story of her success in getting more staff based on this formula to which she was introduced perhaps in 1950 when Ranganathan first visited that country. His earlier book, *Social Bibliography or Physical Bibliography for Librarians* (1952) views

a 'book' in the context of his *laws* from three different angles in reference to their use for different purposes: at one level in relevance to its *soul* (thought—content); at another in relation to its *subtle body* (linguistic medium); and, at yet other level, with regard to its *gross body* (physical medium). These are but a few examples of his creative genius which provides such stimulating insight to many practices and procedures to which librarians, the world over, have been accustomed over the years without any thought searching process.

His *Five Laws* thus provided a normative base, in his writings, on which he builds up his principles for each library activity, however, trivial it may be. But these principles, although distinctly apart from each other are linked together with force drawn his *laws*. The disjointed approach in librarianship, which has tended to develop over the years, and with which Ranganathan's searching mind was unable to reconcile early in 1924 when he had an interface with them in the British setting, has thus suitably been done away with. Initially he wanted to develop these laws or for that matter a native base for the peculiar conditions in India. But within five years of his return to India he was able to develop a philosophical basis for librarianship which eventually resulted in his "formulating a credo of the place of written word in social communication."

Librarianship, as it stands today, owes a great deal to his genius. Unlike other library grammarians, Ranganathan's writings covered total librarianship as his subject of treatment. So much so that if a library school offering degree programme chooses to make use of all his books to support its instructional programme, there may be need for hardly a few books of other authors to supplement them. Shera,³⁴ therefore, called him a one-man library movement. His influence on the library thinking of the world was profound and his achievements are unequalled in the library history.³⁵ Wells³⁶ thus says, "Standing on the four square on the remarkable work of this remarkable man and with the aid of new technology, we now see the possibility of adequately assessing, for the first time, the relative values of all the parts that go to make up a total subject retrieval system." It is his normative base which has helped in the development of a total system approach in the information transfer process of modern library and information sciences

although on a different scale than that of Ranganathan. Sayers,⁸⁷ therefore, was quite true when he called this age as the age of Ranganathan.

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1.5 The Library as a Growing Organism

F.W. LANCASTER

Focuses on Dr S.R. Ranganathan's fifth law of library science: The library is a growing organism. States that with the advent of a 'paperless society', library as a physical artifact may disappear, but the role of professional information specialist will not change much. Points out that Dr Ranganathan would have provided us with leadership in right direction in the present day context. Stresses that observance of fifth law is even more important today with the introduction of modern technology.

Over the past fifty years, Ranganathan has exerted so much influence over so many people in the fields of librarianship and information science that it is extremely difficult to know which aspect of his work to focus upon in any review of his achievements.

Nevertheless, there is one characteristic of Ranganathan's teaching that is often overlooked or misinterpreted, and it is one that has influenced me profoundly in much of my most recent work: Ranganathan was a futurist. By this I mean that he firmly believed that the library profession will only survive and retain its value if it continues to adapt to changes in its environment. This, of course, is the entire thrust of the Fifth Law of Library Science; The library is a Growing Organism.

Moreover, Ranganathan was well aware that environmental change occurs at a more rapid rate with the passage of time. This phenomenon, frequently referred to as the "law of acceleration of progress", was propounded by Henry Adams almost a century ago. I am not aware that Ranganathan ever cited Adams explicitly but he did implicitly on a number of occasions, most obviously in *Documentation: Genesis and Development*, where he illustrates the "acceleration of exploitation of new ideas."¹

Over the past ten years, I have written extensively on what has become known as the "paperless society."² More specifically, I have tried to identify various characteristics of an evolutionary

process that seems to be taking us from a formal communication system based largely on print on paper to one based largely on electronics. One important implication of this is that the library, as a collection of physical artifacts, may well disappear. In fact, the printed book may itself be replaced for most, if not all purposes in the transmission of information. Many librarians have scoffed at such predictions. I am confident, however, that Ranganathan would have supported them. At the very least, he would have approved strongly that the issues had been raised and would have urged that we give serious thought to all aspects of the implications of electronic publishing for the library profession.

After all, Ranganathan raised such questions long before I did. Indeed, in explicating his fifth law, he points out that:

What further stages of evolution are in store for this Growing Organism—the library we cannot anticipate fully. Who knows that a day may not come when the dissemination of knowledge, which is the vital function of libraries, will be realised even by means other than those of the printed book? (pp. 352-3).

Regrettably, few members of the library profession have Ranganathan's foresight, or even his flexibility. In particular, our library schools seem unwilling to make the profound changes to the curriculum needed to prepare the profession to adapt to the rapidly changing social and technological conditions likely to exist in the last decade of the twentieth century. New topics have been added to our studies but the core of what we teach is not fundamentally different from the core of fifty years ago. The focus of the curriculum is still the library as an institution.

An age of electronics, while it may bring the demise of the library, does not necessarily imply that the role of the professional information specialist will become redundant. Indeed, one could argue that such professionals will be even more necessary in the future than they have been in the past.

Were Ranganathan alive today he would undoubtedly urge us to remember the fifth law. Most likely, he would point out that observance of this law is even more important now than it was fifty years ago. Furthermore, he would give us

some leadership, pointed us in the direction in which we should be headed. Therein lies his greatness

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1.6 Five Laws—Revisited

K. NAVLANI and M. S. SIDHU

Outlines the genesis of Five Laws of Library Science, as enunciated by Ranganathan. Examines the laws in the present context of technological advances in which the library and the librarians have to deliver goods and services. Re-states and interprets the laws keeping in view the modern environment of a library and an information centre.

1 GENESIS

Six decades ago, Dr S.R. Ranganathan conceived of the Five Laws of Library Science. These were formulated in 1928 and published for the first time in 1931.¹ Fate had ordained this mathematics lecturer to shift to librarianship in 1924, a momentous decision, to start a new chapter in the field of library science, which earned him title of 'Father of Library Science in India'. His contributions are internationally acknowledged, and many honours conferred on him and the citation records are witness to that.

Ranganathan was appointed Librarian of the University of Madras and deputed to study practices in the British Museum Library. On the advice of the then Principal Librarian of the Library, Sir Frederic Kanyon, he joined the School of Librarianship, University College, London, where he came into contact with an infectious personality, W.C. Berwick Sayers, his teacher. His visits to over a hundred libraries in Great Britain to have a first hand knowledge of various library practices and services and to study of literature on librarianship made his observing mind realise that precious little was available in the field as guiding principles for the services on a whole. There were some principles for classification by Sayers or cataloguing by Cutter, etc. However, his inquisitive mind, trained in scientific study, felt the need for unified principles which should be the basis of every practice and technique in

libraries throughout the world.

2 FIVE LAWS OF LIBRARY SCIENCE

The first law was the intuitive flash of Prof Ross,³ his mathematics teacher, who was his friend and guide, and the rest of the laws were propounded by Ranganathan. These five are :

Books are for use
Every reader his book
Every book its reader
Save the time of the reader
Library is a growing organism

In master's own words, they contain "in little, practically everything which is found more elaborately elucidated in all the succeeding books of the family"³ Which numbered 1500 papers and about 62 books.⁴ The work "is a verbal record of the *ekavakyata* [unity] of library practice and science as it revealed itself to me."⁵

21 Assessment

This work has been both appreciated as well as criticised. Sayers regards it "a work of great simplicity which conceals depths and yet reveals what may be called the spiritual but intensely practical springs of activity"⁶ In the opinion of Dr. Shera,⁷ three of his laws tell the objectives of the library more effectively.

Mr Girja Kumar, the present ILA President, considers it "His best 'literary effort' ... [and] one of best testaments to the library profession,"⁸ Professor Atherton is of the view that "If Dr. Ranganathan had done nothing more than publish *Five Laws of Library Science*, he would have to be seriously considered for a Library Hall of Fame . . . Few writers have caught the essence of librarianship in such few words and have been as eloquent as Dr. Ranganathan."⁹ F G. Graves reviewing the second edition of the book observes that "the laws themselves have as much validity now as they ever did. They have been formulated in fewer than 25 words."¹⁰

The laws have also met criticism from some quarters. Some

regard them as self evident, simple or even "a part of dross of library science."¹¹

22 *Modification*

These laws are a perennial source of inspiration for services and guidance, for the dynamic development of the subject. Demand for nascent microthought by specialists gave birth to new form of service : Documentation. Accordingly, Ranganathan modified the Laws as under :

Documents are for use
Every reader his document
Every document its reader
Save the time of the reader ;
A library is a growing organism.¹²

3 INFORMATION ON AGE AND THE FIVE LAWS

Growth of knowledge, users demands, computers, and advances in telecommunication and their thrust in transfer of information, have changed the entire world. Books and libraries are no exception to them. Some disciples of Ranganathan such as Prof A.P. Srivastava,¹³ and Dr. Bhattacharya have suggested to reformulate these Laws by replacing the words 'book' and 'reader, with 'information' and 'user' respectively. As such, the laws would be :

Information is for use.
Every information user his/her information.
Every piece of information its user.
Save the time of the information user.
The universe of information is ever growing.¹⁴

4 FIRST LAW

41 *Books are for use Implications*

Let us compare the implications of these modified laws with those of Dr Ranganathan.

The message of the first law is to remove restrictions in the use of books. Its implications as recorded by Dr. Ranganathan are : to make decision about the location of the library on

shop analogy, keep open the library all the working hours, make library furniture comfortable, opt for open access, and appoint qualified staff in proper number with suitable status, who should cultivate service attitude towards readers.

The implications of this Law are limited actually to make the book, the physical carrier of information, accessible to user.

42 Information is for Use—Implications

It takes the law further. It implies to make not only the thought carrier, the document, but also the thought content in it, directly accessible and available for use. The user should have interface with the information. The Law asks for removing all restrictions in the free flow and use of information. It further calls for use of electronic media for presentation of information, use of online networks to make information easily accessible and more facilities including translation services, for making information universally available for use.

The capabilities of the electronic media have a profound effect on the way information is presented and used. Not only there is better accessibility and better availability due to photocomposition technology and T.V. but there is also better use. Electronic text—document, is not static like its printed partner. The former is capable of organisation into various sequences to meet the needs of different users. We can add any comment, update it, and have access instantly to any portion of it.

5 SECOND LAW

51 Every Reader His Book

In order to reach every one, the law stresses that the library should reach the city and country folk, men and women, classes and masses, the normal and the abnormal, the literate and the illiterate the child and the adult. It magnifies the library into a nation-wide problem by asking the state to provide library system in the country, enact laws and sanction funds for it.

The local library authority is to fulfil the obligation of the law by proper book selection and appointing competent staff.

The staff is to help the reader to get his/her book and so also the reader is under obligation to conduct himself in such a way that others also get their due share.

52 EVERY USER HIS/HER INFORMATION

The message seems to be utopian. Thanks to advancement of 'Third wave' technology, the ideal of reaching all can now be achieved. With the arrival of big computers, microprocessors, minicomputers and home computers, and their interconnection into networks through online system, these chips have come to home and hearth of nearly all, in advanced countries. The new technology offers instant access to information sources stored in databases and databanks and the user can also communicate with any one else in the system. The law advises the third world countries to go in for new technology to meet the goal.

Transfer of information to every user also implies that stumbling blocks such as language barrier, bars in free flow and access to information are to be overcome and transmission costs of information reduced to make information universally available.

6 THIRD LAW

61 *Every Book its Reader*

It advocates for open access, classified shelf arrangement and inner arrangement of the library be such as to help the book to find out its reader. It also pleads for catalogue, reference service, publicity, extension service, and proper book selection and use of such other devices so as to aid the book to reach its reader.

However, the law is based on the Law of Probability. Researches in the use of collections in libraries reviewed by Lancaster¹⁵ have reported that chances of every book finding its reader even in well organised and well serviced libraries are not 100%. We all know, that many of the books in libraries remain unused.

A survey of use of collection of a university library conducted by one of the present authors,¹⁶ has revealed that 40% of the books were never issued out. The findings confirm that every book does not find its reader.

62 *Every Piece of Information its User*

King's study has found that in 1977, 38,23,000 articles were written, while their use per copy distributed to scientists in USA through libraries was 05%.¹⁷ The "publish or perish" syndrome certainly contributes to the information "glut".¹⁸ Wilensky observes that in government and many institutions and associations and in every other sphere of modern life, the chronic condition is a *surfeit of information*, useless, poorly integrated...¹⁹ Should we then say: "Every piece of information its user?"

In our humble opinion, the Third Law purports to say to maximise exposure of information, devise tools in its light and provide active information service so that information is brought to the notice of its potential user.

7 FOURTH LAW

71 *Save the Time of the Reader*

It implies to opt for such devices which save the time of the reader. It votes for open access, 'APUPA' pattern of classified arrangement of books on shelves, stack-room and other guides, various types of catalogue entries, bibliographies, reference service, issue methods which save time, inter-library cooperation, central location of the library, etc.

72 *Save the Time of the User*

The message of the law is to use the latest technology in information operation—automated circulation, online cataloguing, etc., provide alerting, SDI, indexing, abstracting, reprographic, translation etc. services; and educate the user in the use of information systems.

The library and information profession should also educate and equip itself for provision of consultancy services to information seekers. The task is gigantic. More and more users would be needing more and more information, in the information age. Considering the growth of online bases in the last few years and momentum behind the developments in the information and computer technology and continuation in the explosion of available information sources, keeping up with the flood of information, to save the time of the user will be difficult and challenging task for information specialists. The

advent of the home computer and services like *The Source* and the *Prestel*, may bring about a huge increase in the online user population. Other desiderata of the law are: systems standardisation, vocabulary assistance in search of information, online user manuals, improved databases and databanks, directories, etc.

8 FIFTH LAW

81 *Library is a Growing Organism*

It tells us the vital characteristics of a library as an institution, i.e., "from the physical facilities to administrative practices, the library must be open ended, always ready to expand"²⁰ as Garfield beautifully describes it in a nutshell. Its tips are for the future planning and organisation of a library.

82 *Universe of Information is a Growing Organism*

There is information explosion. Computers and telecommunication networks provide instant access to remote sources of information stored in databases and databanks. These sources are not physically present on the shelves of a library. And its impact is profound on the library. Information is deinstitutionalised. The owner of a home computer with interactive T.V., may bypass a library, yet may have access to electronic information sources. Findings of OPAC user studies confirm that the "clientele would prefer using the OPAC at a site away from the library building."²¹ Some of the experts in the field like Lancaster²², Stefani²³ believe that if online use instructions and command languages are developed so that users can easily manipulate their own searches, search of information through library may decrease. Library may even vanish but information will keep on increasing, according to them.

Hence, the Fifth Law points out to the planners and policy makers at national and international levels to plan and formulate national information policies and strive for international cooperation and networks. The concept of shared resources is now a reality in advanced countries. "Imaginative and resourceful library managers must become information network managers and their staff must be reoriented to focus on the wider goals of services and cooperative efforts."²⁴ We should also embed within these networks instructional

messages to facilitate work of information users, for the task of information seeking is not a substantive part of their daily life.

9 CONCLUSION

"We are altering our info-sphere fundamentally. We are not merely de-massifying the Second Wave media, but we are adding whole new strata of communication to the social system. The emerging Third-wave info-sphere makes that of the Second Wave era—dominated by its mass media.....seem hopelessly primitive by contrast,"²⁵ forecast the famous futurologist, Alvin Toffler.

It is obvious that future of the library is inextricably entwined with that of the communication and information systems in the society.

The work—*Five Laws of Library Science* in its present form, interprets the library and its services in the old context of the society, which has changed. It also mentions traditional tools only, while discussing implications of the laws.

"Information concepts and technologies are changing so rapidly that even the most alert librarian is hard-pressed to keep current,"²⁶ echoes Adrienne Hickey. These are transforming both the internal working of the library and the services it offers to users, nay they are even raising the questions against the library as a disseminator as well as a depository of knowledge and information and its long cherished tradition of free access, availability and use of information.

Hence, it is high time, that we should address ourselves to these problems and reinterpret the "Five Laws" in the present and future context of information age and in the light of new needs and new technologies, which bring in new constraints.

Secondly, a lot of research has been carried out. The findings of such research should be incorporated while discussing implications of these Laws.

The above observations only give an outline/overview of the issues which need our attention, while reinterpreting the implications of the laws in the changed context. A detailed examination of these points is compellingly necessary to make the laws up to date.

It may be added here, that these laws are obviously ideals.

And none is completely achievable. Nevertheless, they do set forth goals that we should endeavour to achieve in future also. They are worth consideration of information systems designers and operators, as well as planners and policy makers at local, national and international levels. And fortunately, new technologies provide better means by which gignatic steps can be made towards meeting these goals.

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1.7 Information Institutions : Pattern of Growth and Development with a Perspective of the Future

T. S. RAJAGOPALAN and T. N. RAJAN

Depicts the growth pattern of institutions for knowledge and information in the last half a century and further delineates the present situation in detail. Also focuses attention on planned institution building, providing a few guidelines, with particular reference to third world countries. Concludes with a scenario based on growth pattern of institutions in past and present, keeping in view the rapidly changing context of information.

1 INTRODUCTION

In Dr Ranganathan's Fifth Law of Library Science - Library is a growing organism—the word 'Organism' implies a system concept, 'growing' connotes a living system ever capable of forming new components with an automatic and self-adapting mechanism in a continuously changing environment and 'Library' can be interpreted as a synecdoche, representing a typical component of the system, standing for the whole. Indeed the statement envisions a dynamic institutional structure capable of meeting the challenges of modern information demands, caused by a self-propelling, multi-dimensional growth of information and knowledge. Interestingly, Dr Ranganathan accentuates on institutional infrastructure for 'information' as later writers forcefully emphasise and corroborate. Peter Drucker, for instance, says "during the last fifty years, society in every developed country has become a society of institutions. Every major task, whether economic performance or health care, education or protection of environment, pursuit of new knowledge or defence, is today being entrusted to big organisations, designed for perpetuity and managed by their own managements. On the performance of these institutions, the performance of modern society—if not the survival of each individual—increasingly depends." (Drucker) These farsighted thinkings of two authorities, quite clearly stress the impor-

since significance and role of institutions in national development. As modern society is a society of institutions, entering into the information age, institutions building assumes special importance, institution building has, in fact, been receiving attention as a subject of study and research in its own right, distilled out of experience and knowledge in building up institutions in various areas and context. With this premise, this paper attempts to

- (i) depict the growth pattern of institutions for knowledge and information in the last half a century
- (ii) delineate in some detail the present situation,
- (iii) focus attention on planned institution building, providing a few guidelines, with particular reference to third world countries and
- (iv) give a scenario of the future on the basis on (i) and (ii) above keeping in view in the rapidly changing context of information

2 KNOWLEDGE AND INFORMATION

At the outset it is necessary to state here the distinction between information and knowledge. "Information is news, facts, statistics, reports, legislation, tax codes, judicial decisions, resolutions and the like and it is quite obvious that we have had 'explosion' of these not only with the multiplication of organisations but because all countries and the diverse world politics and the world-wide economy now come under our daily scrutiny in newspapers and television and in the pages of specialised magazines. Knowledge is interpretation in context, exegesis, relatedness and conceptualization, the forms of argument. The results of knowledge are theories, the effort to establish relevant relationships or connections between facts, data and other information in some coherent form and to explain the reasons for these generalisations" (Bell). Institutions have been built to handle both knowledge and information and a variety of them have sprung up. The development process needs the use and application of both of them.

3 INFORMATION TRANSFER CHAIN

The process of transfer of information/knowledge is usually seen as a chain of activities, the links being generator, editor, publisher of primary publications, indexing and abstracting journal producers, libraries, documentation and information centres, on-line services, information companies and the end user. Institutions that perform these activities can be broadly grouped into three categories as follows:

- (i) knowledge creating institutions, e.g. research laboratories, R and D institutions, institutions for higher education and research attached to universities, etc.;
- (ii) Knowledge/information processing and disseminating institutions, e.g. journal and book publishers, statistical data organisations S and T data centres and the like; and
- (iii) Institutions that collect, store, process, disseminate and service knowledge/information recorded in various forms.

Over the years, there has been an increasing interaction and cooperation between all these institutions. With the application of fast developing technology to information generation, processing, dissemination, distribution and use, many of these functions are getting blended, blurring the link elements of the information chain. At present, however, the different types of institutions mentioned above operate with their distinct identity. It is only with the second and third groups of institutions that we are primarily concerned with here.

4 GROWTH PATTERN OF INSTITUTIONS

There have not been many studies on information institution growth. The most thorough and useful study has been that of Vincent Giuliano for the consulting firm Arthur D Little, Inc. Giving an historical perspective of the information transfer pattern and the institutional framework, the study describes three basic modes of information transfer, each corresponding to a different value system. The three modes are:

1. Disciplinary Information Transfer corresponding to the value of pure science, academic and basic research—called *Era I*.

2. Mission Information Transfer corresponding to the value system of government sponsored missions (like AEC, NASA in the 1960s)—called *Era II*, and

3. Problem—oriented Information Transfer corresponding to the value system of solving societal problem—called *Era III*.

The principal characteristics and features of the three Eras of information transfer are as follows :

ERA I : Discipline-Oriented—Basic Ethic—Knowledge for Knowledge

These are meant primarily to support education, research and development. Information is generally disseminated through journals, monographs, seminars and meetings usually associated with academic and research institutions, learned societies, professional bodies and the like. Access to primary information is through indexing, abstracting and bibliographical publication. Institutions facilitating access to documents and use are largely the *academic and other institutional libraries* though direct access to primary information is available. The user communities are the students, academicians, scholars, research workers and others. Financial support to the system is through internal budgetary provisions, grants and government subsidies. These services are free. This traditional system has been continuing for a long time, notwithstanding the strains and stresses now being encountered by the different components of the system such as libraries and journal publishing. The situations provide for direct feedback, in that the producer/user complexes control the quality, content and objectives of the system.

ERA II : Mission-Oriented—Basic Ethic—Organise to Do a Job

The Era II information systems developed during the 1950s and through mid 1960s have been created to provide support to mission-oriented agencies like AEC, NASA and such others. Here the information transfer process is characterised by a need for coordinating and using knowledge simultaneously from a variety of disciplines, as in the case of NASA mission where inputs of information from electronics, biology, medicine, aeronautics, chemistry, physics, etc. are required. Information is disseminated through primary publications like

technical reports, besides journals and other traditional publications. Secondary services providing access to primary information function are through varying degrees of interpretative and abstracting tools. The *technical information centres* that offer these services, being part of the mission agencies, mostly governmental establishments, get their budgetary appropriations. The user communities are the scientists, engineers and technologists and managers. The feedback mechanism for controlling the system and using it to determine the needs for information or research are more or less similar to those of Era I, but the flow of information between the two systems has been unequal. While the mission-oriented system drawn heavily from discipline-oriented information system, only limited reverse flow is provided through primary journals and some technical reports.

During this period, newsletters and trade journals, increasing in importance, have been reflecting that some of STI systems have a major economic value and that a less formal and more market-oriented information transfer mechanism is the one that is appropriate.

ERA III : Problem-Oriented—Basic Ethic—Solving Societal Problems

Problem-oriented information systems have begun to emerge from the late sixties with growing thrust in the seventies. The systems represent a context in which information is utilised for societal problem-solving such as economic well-being, environmental protection, agricultural productivity, energy availability/use, public health care/safety, and disaster prevention/control. The type and structure of systems that can handle Era III information, providing new products and services, have not yet been established, institutionalised or legitimised, but some characteristics and possibilities are beginning to emerge.

Information flow for Era III has not yet been evolved. The users of the problem-oriented systems are often ill-defined but involve a variety of groups—elected officials and their staffs, bureaucrats and civil servants, businessmen and industrialists, legal professionals and judiciary, scientists, engineers, technologists, consultants, media people and the general public. Apart from information required from a large number of disciplines—a major portion non-STI—some of the categories

of information required are local, ill-organised, proprietary or value oriented, involving value judgements

Information brokers, consultants and intermediaries are the new type of institutions emerging to offer the specialised quality of service. Repackaged information collected from a variety of sources with validated and authentic data is the type of specific information service expected. STI infrastructure is historically designed for meeting the information needs of scientists and technologists. In fact, STI traditionally has been prepared for communication to audiences of high technical competence, and such others having the training to understand the material communicated. Expanding the context of information usage to societal problem solving brings in new problems of interpreting technical results appropriately to enable non-technical users to take well informed and responsible decisions.

Naturally, this type of information is available only at a price. Information industry, a private enterprise and highly market-oriented and taking risks to attend to the needs of consumers, has emerged. Era II institutions draw heavily from Era I system but at no extra cost or at best at nominal cost.

ERA IV Individual-Oriented or Customized Information Service

Toni Carbo Bearman, Executive Director of US National Commission on Libraries and Information Science believes, that an Era IV Information Transfer is emerging, in which repackaging of products and services is being designed to meet the needs of individuals whether at home or in business and industry. "This era introduces exciting new challenges for information professionals to identify individuals' user's needs, develop new products and markets and sell them. Delivery of information to home-bound citizens and the packaging of information for the scientists in industry are just two examples of these services" (Bearman).

5 INFORMATION INDUSTRY

The most striking and significant development of information institutions in the 1970s and 1980s has been the growth of

information industries. They are also known as Fee-based Information Services, Information On-demand Companies, Information Consultancies, Information Brokers, Intermediaries, etc. There are currently more than 300 such companies in the United States and similar compaines are springing up in Austria, Belgium, France, Germany, the Netherlands, Spain, Switzerland, U.K. and Yugoslavia. A recent directory of Information Business in 1984, being a guide to companies and individuals of the Information Industry Association, lists the following categories of services offered :

Content services	Integrating services
Content package	Communication technologies
Facilitation services	Communication channels
Information technologies	Broadcast channels

These services purview the following range of activities in a combination of three or four :

Analytical reports	Management records
Bibliographies	Indexing
Cataloguing	Information on-demand
Data base design and implementation	Library planning
Document delivery	On-line searching
Research	Vocabulary/thesaurus building

The Encyclopaedia of information Services and Systems lists in its fifth edition 2500 entires which include most of these companies. The major groups of organisations that offer services in information are :

Library and Information networks	Data collection and analysis
Software products	Information on-demand
Abstracting and indexing services	Library management systems
Professional associations	Micrographic application and services
Computer searching	On-line vendors/Telecommuni-
Consulting and planning services	cation networks

Data base producers and publishers	Current awareness/SDI
Research and research projects	

While the major ones such as PREDICASTS, Arthur Little Co, Inc., Lockheed Information Services, Bibliographic Retrieval Service, New York Times Information Banks, etc. have been operating for a long time, many of the smaller set-ups having flourished from late seventies and grown in the eighties. Only five of the largest of these industrial enterprises employ more than 25 persons, medium sized 5-23 and small one fewer than 5. There are also single person free-lance consultants, non-project organisations and internal services within larger organisations. The large firms are founded by people with background in journalism, law, business administration, etc. and are generally staffed by subject specialists. The medium sized firms are run by information specialists with background in library automation, information retrieval, system design and analysis, research management, etc. The small commercial services are staffed by information specialists with or without advanced degrees in subject fields. (Maranjian and Boss)

6 INSTITUTION BUILDING

The panoramic view of the historical perspective of the information/institutions portrayed above indicates clearly that the growth and development of these institutions have been rather *ad hoc*, meeting information needs as they arose and not necessarily on the basis a well-planned and thought out process. While most of the Knowledge/Information based institutions of the sixties were motivated by a sense of Cooperation, information industries are introduced an element of competitions with a clean introduction of profit. In the post-war development of information institutions, however, the planning and development of the British Library stand out without comparison. Without breaking with the past, introducing every element of modernisation, showing a characteristic British business acumen in document delivery, and a keen sense of

the future with liberal funding of research projects, the British Library indeed is few equals.

But the strategies and approaches for institution building will naturally vary from country to country in accordance with their respective circumstances, requirements, priorities and the level of existing institutions. An institution should have its goals, objectives and criteria for priorities. It should have challenges and opportunities, carefully conceived roles, well defined tasks and a clear sense of purpose. Its programmes should be symbolic of what it stands for and its role in society infused with societal values. It has a purpose, function and ability to service and serve clientele, relevant to needs, time and environment (Navulamma). The effectiveness of these institutions may be judged by their contacts with users and their information needs in different contexts and contributing in full measure to the decision-making processes for economic, industrial and social development.

All types of institutions irrespective of subjects affiliation and activities contribute to the development process. But development itself is a complex process, a continuous and transdisciplinary one, requiring multi-pronged task forces, cutting across vertical and horizontal structures to achieve desired results. A concerted and coordinated endeavour is needed to build proper structures by government, industry, STSI institutions, etc. In fact, a transdisciplinary culture has to be cultivated. This calls for a network of institutions allowing organised information flow from top to bottom and between coordinated and collateral levels.

Western models available to the third world countries must be examined in the context of the requirements of countries concerned and adopted or adapted only if they could ensure results. There is an increasing insistence on endogenous endeavours to meet national requirements in which the long run could assure better results. Endogenous models with various alternatives to match specifically need-based information institutions are to be designed and developed.

Information institution building is also a complex process, involving men, materials, machinery and money and have to be managed effectively for obtaining maximum results. Clear perspective and farsightedness, determining appropriate goals and objectives, fixing targets, for outputs, careful planning

with guidelines of policies, criteria for priorities and efficient execution, organisation and management—all these are essential elements in institution building. Above all, availability of the right kind of manpower in an appropriate measure and quality is a *sine qua non*, if meaningful achievements are to be expected.

7 SCENARIO OF THE FUTURE

The shape of things to come in the twentyfirst century has been predicted by a number of writers, particularly with reference to industrially advanced countries. Alvin Toffler, for instance, says that the info-society of the future will commence a new civilization which will restructure education, redefine scientific research and completely reorganise the media of communication. "The Third Wave civilization will rest on intensive, de-massified media, feeding extremely diverse and often highly personalised imagery into and out of mid-stream of the society." (Toffler) He sees deinstitutionalisation in this third wave civilization which will be characteristic of individualistic services. He predicts a total change from the present day industrial society, institution building getting a back seat.

Daniel Bell does not envisage deinstitutionalisation in his post-industrial society. Communication and knowledge being the strategic resource and transforming agents of the post-industrial society, will pose economic-political problems—one structural and the other intellectual. The structural problem will raise the issue of centralisation versus decentralisation. What kind of techno-organisation is best designed to be efficient, meet consumer use,—industrial, commercial, financial, scientific, library and information—and remain flexible enough to allow for continuing technological development. This has always been a controversial issue and may continue to be so. In fact, political organisational pattern may set the tune for the type of other organisations. The second policy problem is intellectual which is concerned with information policy, particularly the dissemination of scientific and technical information. The governments would be committed to the furtherance of R & D to increase productivity which will depend on the more efficient distribution of knowledge.

Lancaster predicts disembodiment of the library in the paperless society. The new institution for information will be consultancy organisations, equipped with machines of various kinds, connected to remote data bases and bank on-line and offer consumer-oriented services based on needs. The variation in institutions will be in the nature of services they offer and their scale of operations. More networks, consortia and systems may be conceived.

All these predictions are noted, as mentioned earlier, in the context of the western society. The third world countries, more particularly India, are not yet poised for any of the changes, now taking place or envisaged. The impact of information technology is seen in the field of mass communication, more precisely in broadcasting and television, a large part of these being entertainment and news dissemination. But what are happening in the western world, particularly in information and communication will have a telling effect on the nature of our present services in information offered in libraries and information centres. No study has yet been made on the sociological, economic, educational and research aspects vis-a-vis information and knowledge and information technology. How our institutions disseminating information will shape, will largely depend upon professional initiatives. It is not just moving into the machine age, of information, but putting knowledge and information to work. Endogenous models are necessary to suit the development processes of the country and also suit the Indian genius. Dr. Ranganathan made original contributions in giving a definite shape to our information institutions of libraries, and documentation and information centres. It is the duty of the information professionals of today to dedicate themselves to the relentless pursuit of research and innovations in information field to remodel our information institutions.

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1.8 Ranganathan's Laws of Library Science and the Marketing Approach to Library and Information Services

V.K. RANGRA

Explains the significance of the Five Laws of Library Science in relation to the importance of reader in the library organisation and service. Traces the growth of library and information service into an industry, to which marketing concepts are applicable as to any non-profit organisation. Defines marketing, differentiates between marketing service products and product services and gives characteristics of library and information services in the marketing environments. Describes salient features of marketing analysis and marketing mix and the role of information brokers in the information industry. Concludes with the remarks that the spirit behind the five laws agrees well with the marketing concept.

1 FIVE LAWS OF LIBRARY SCIENCE

Ranganathan has given birth to so many new ideas, which took concrete shape after his death, one of these being the marketing approach to library and information service. His *Five Laws of Library Science* have direct bearing on the reader user who is centre of all library and information activities, with the prime motive of providing him with full satisfaction.

Ranganathan formulated his laws in 1928, which were first published in book form in 1931. These laws look very simple but have great implications in all spheres of library organisation and service as explained by Ranganathan himself in his book *The Five Laws of Library Science*. The five laws are :

- 1 Book are for use.**
- 2 Every reader his/her book**
- 3 Every book its reader**
- 4 Save the time of the reader**
- 5 Library is a growing organism**

The first law implies that books should be made easily accessible to the readers by declaring the libraries open-access and making the libraries functionally efficient. The second law takes into consideration various types of readers and their changing needs for information, which should be taken into account by the library staff for appropriate action. This law calls for better classification/cataloguing system and shelf arrangement. It also points out the necessity of dynamic reference and personalized information service. The third law urges that appropriate reader should be found for every book acquired in the library which necessitates the publicity and promotional work in the form of accession lists, information bulletins, newsletters and such other in-house publications called current awareness/alert services. The fourth law requires that there should be no time lag between the demand received from the reader and the supply made to him. According to the fifth law, a library is an institution which has all the attributes of a growing organism, which can take new matter, cast off old matter, change in size and take new shapes and forms. A library is a trinity of books, readers and staff. The library organisation should plan its layout in such a way as to make it easy to keep pace with its future growth.

Prof. Anthony H. Thompson of the College of Librarianship, Wales (UK) in the Ranganathan Memorial Lecture (8) held at National Aeronautical Laboratory on 15-17 Jan. 1985 updated the Five Laws of Library Science by substituting information, user, information centre for book, reader and library respectively. This he thought necessary in view of the developments taking place in the present times, which is rightly called the informage age.

2 GROWTH OF INFORMATION INDUSTRY

In earlier times, library and information services were confined to books and other printed material available in local libraries which adequately served the requirements of readers/researchers without much inconvenience. The library and information service was free or highly subsidized.

The situation changed when research and development (R & D) activity came to be used for national development. R & D work in modern times is usually taken up as projects with

defined cost and time frames. It is endeavour of every R & D team to complete the project expeditiously by eliminating duplication of effort. Thus at the start of the project i.e. the formulation stage, they require to know what work in different parts of the world has been done or is being done on the subject under investigation. This type of information was provided through the conventional indexing and abstracting journals, which was laborious and time consuming task. All these indexing and abstracting services are now available as computerised on-line data bases. Cuadra has listed 1927 different on-line data bases which are functioning in various formats such as software, textual—numeric, referral, full-text, bibliographic, numeric etc. It is now possible to have access to on-line data bases of one's choice from any where in the world, the only requirement being a telephone line and a telex/computer terminal for communication and interaction. The on-line access to foreign data-bases provides a world-wide comprehensive information which may sometime play a crucial role in progressing of the projects and achievement of significant results.

21 Information is Costly

The present-day information systems use highly sophisticated gadgets of modern technology such as word processor, computer, and telecommunication network, for information, generation, processing and transmission and thereby acquire cost factor which is sometimes very high. The building of database itself is a very costly affair. A file of Crystallographic Data Centre, containing some 45,000 records represents a total investment of 225 million, which is reflected in the service cost charged from the customer/user.

Information, therefore is no longer a free service, if one wants instant, comprehensive, upto date and world-wide coverage of information. With so many data-bases available on-line and agencies to operate them, information has grown into a big industry. In USA information is only next to oil and automobile industries and employs more than 50% of human force.

In the present-day environment when users' requirements are urgent, especially for R and D management and planning, information has to be provided to them at whatever cost available.

It is in this context that marketing approach to information services assumes relevance.

3 WHAT IS MARKETING

Marketing is considered synonymous with promotion, publicity or advertisement. These activities represent only a small part of an organisation's total marketing programme. It is not another name for selling. By selling it is specifically intended to clinch a transaction to persuade a customer to agree to acquire the product or service offered at the prevailing price. Only good marketing can sell a product or a service twice to a customer. Whereas selling focuses on the interest of the seller, marketing takes into consideration the needs of the buyer. Marketing has been defined by Santon as a total system of interacting, business activities designed to plan, price, promote and distribute want-satisfying products and services to present and potential customers. According to Kotler, marketing is the applied social science concerned with the management of exchange relations among people who provide products or services (i.e. producers) and their current or potential clients (i.e. consumers). In other words, marketing is that function of the organisation that can keep in constant touch with the consumers, read their needs, develop products that meet their needs, and build a programme to express the organisation's purpose.

31 *Marketing in Information*

In the information using and producing environment, the marketing process starts with observations or hypotheses based on evaluation of user needs and wants. From such studies, the information products supplier must arrive at decisions as to the types and specifications of products that fulfill the needs; decisions on concept, design, format and probable costs; evaluation of the composition and size of the market; methods of promoting and pricing the service; choice of distribution channels; procedure for training of field sales force 'intermediaries' and ultimate users of the service; and estimation of revenue and profits.

32 *Marketing Services*

The principles of marketing apply to the marketing of services

just as they do in the marketing of consumer and industrial products. The library and information services fall under the marketing services. These are of two types.

321 Service Products

These services are marketed purely as a service and comprise those products which produce a series of benefits which cannot be stored. They must be consumed at the time of the manufacture i.e. a railway seat, or a hotel room cannot be stored for later use. Service products include insurance, cleaning, travel, security, education, health, consultancy.

322 Product Services

These are offered along with industrial consumer goods and are often inseparable part of the package e.g. computer installation and maintenance, system study report before sale and after sale maintenance service.

In fact the customers do not buy products or services; they buy the benefits that these products or services provide.

33 Marketing of Library and Information Services **Characteristics**

Bessen and Jackson distinguished three unique aspects of services that could affect marketing strategy:

- (i) intangible nature of service makes it difficult for a consumer to evaluate competitive offerings.
- (ii) indivisible relationship of the producer and the services which localizes the marketing and reduces the number of alternatives to the consumers.
- (iii) perishability of service which can be illustrated by the hotel room which if vacant for a night represents revenue lost forever to the organisation. In library service, it may be the non-use of books, low rate of library visitors, etc.

The risk in marketing services is greater than in marketing products because services cannot be stored. Another difficulty in handling service is that a dissatisfied customer cannot return a service he has as can usually return an unsatisfactory product e.g. information provided in response to a query at the reference desk. In addition, a potential customer of a service as com-

pared to a product can often choose to perform the service for himself e.g. use of catalogue and location of book on the shelf, operation of on-line terminal etc.

34 Marketing Analysis

341 Segmentation

The first step in marketing analysis involves segmenting the potential market into smaller sub-markets consisting of individuals who are essentially similar in their needs. The basis of segmentation may be; (i) by status e.g. in R & D environment, bench worker, project leader, top manager; (ii) type of information needs e.g. reference, current awareness; (iii) functional units of users e.g. instruction, research; management; (iv) discipline orientation of users e.g. physics, electronics, medicine.

The market segmentation analysis must be repeated periodically with atleast the same frequency which reflect significant variability in the market

342 Matching Services to Users

The range of library and information services being offered may be matched to the needs of those groups which have been identified and decided to serve. This satisfies the third law i.e. Every book its reader.

343 Matching Services Against Target Markets

The first step is to know the requirements of the potential user group by carrying out consumer surveys and group interviews, based on which, new services and products can be developed and introduced in the market. This conforms to the second law i.e. Every reader his/her book. In the SDI service, great importance is attached to the User's interest profile which is continually updated on the basis of feed back provided by the user on the usefulness of information provided to him through SDI listings.

35 Marketing Research

Development of proper marketing strategies for established and new services rests upon understanding of the market segmentation analysis and of the user's needs and behavioural patterns.

A basic postulate of market research is the continual obsolescence of current factual data. In the case of market research for information services, which involves the study of communication and behavioural patterns of the users and those to whom he delegates his search, it is evident that research activity must continuously study the changing needs of users to avoid basing strategies on past, no longer applicable assumptions. Marketing research is especially applicable to answer questions about the basic elements of what the marketing professionals have identified as the marketing mix.

351 *Four Ps—The Marketing Mix*

The larger share of the business is obtained through making significant changes in one or more of the so-called four Ps of marketing i.e. product, price, promotion and place, which raise the following points:

- (i) What changes if any are you making in the product offering?
- (ii) Is the price of that product in terms of time, money or psychic energy being reduced?
- (iii) Are you promoting the product through advertising (or personal selling) which stresses, how much users needs will be satisfied or their problem solved?
- (iv) Finally, is your product or service going to be offered at a more appropriate time and place?

Research is necessary in each of these areas (four Ps) to maximize final acceptability and success of the information services and products.

36 *Information Brokers*

With information becoming a saleable commodity and growing into a big industry, of new service group has emerged, who specializes in providing a package of information for a fee in response to needs and demands of information clients. This is called fee-based information service. It offers a combination of services namely data base searching, document delivery, information research and analysis, information management etc. Most of these services are operating in the private sector. Three such major information brokers, also called vendors, are

DIALOG, BRS (Bibliographic Retrieval Service), SDC (System Development Corporation).

4 CONCLUSION

Library and information services, as operated through public institution, come under non-profit institutions, where the emphasis shifts from profit to service. But since these institutions spend public funds, it is necessary to carry out some sort of evaluation of the services rendered by them. The utility of current services being provided and the new services to be started, should be evaluated through users' surveys which is one of the techniques of marketing analysis. Although application of marketing concept to library and information services is only fifteen years old (the first paper appeared around 1970), nevertheless, its appreciation by the professionals will encourage them to derive maximum benefits from these applications. Had Ranganathan been alive, he would have certainly welcomed the marketing concept and enriched it with his contributions. The spirit behind his five laws agrees well the marketing concept, as applicable to the non-profit institutions.

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1.9 Five Laws: The Theory and Philosophy of Library and Information Science

MOHINDER PARTAP SATJIA

In any discipline, practices must be reduced to some objective laws which guide and enable other workers to work properly. It is, thus, necessary to formulate a theory to give status to the profession. Describes Dr S.R. Ranganathan's role in providing a sound theory to the practices already existing in Library and Information Science. Further traces the derivation of laws of library science over the years. Explains philosophy behind the laws and their application to various areas in Library Science.

1 INTERACTION OF THEORY AND PRACTICE

Ranganathan subscribes to that school of thought which supposes that practice exists before theory, i.e., art precedes science.¹ For example, poetry existed long before the Hindus or Greeks formulated its theory. Every discipline is first practised in a spontaneous and casual way either out of an inner urge or as a social necessity. Being influenced by the environments and due to lack of communication or to some differences in fundamental thinking, these practices differ from place to place. But after a long time, as an unwritten but impeccable law of nature, it interests someone to collect and compare all the current and retrospective practices to identify the areas of inter-compatibility and not the least, to compile the best features of each. From this type of study, emanates a body of theoretical principles, which is given the name of laws, theory, philosophy and the like. In Indian tradition the first stage is named as *Lakshya—grantha*, and the second as *Lakshna—grantha*.² In modern terminology, we designate these stages as art and science respectively. Every theory is distilled from practice. This theory in turn helps to improve the prevailing practices. This improvement in practice further refines the theory. In this way, the alternating interaction goes on; practice and theory promote and refine each other endlessly. For example, "progressing technology is an absolutely essential for a progressing science" veritably writes Hermann

Bondi.³ Writing of the alternating effect, he further says, "It is true that modern technology derives from modern science, but we would not have had any of modern science without modern technology." Moreover, it is absolutely essential that subjective practices must be reduced to some objective laws guiding and enabling other workers in the field to follow suit. Formulation of a theory is also necessary to get a discipline the status of a profession, and to give to it academic recognition. Only this can keep a subject surviving and progressing. The oblivious fate of the Dhaka muslin weavers is before us. The great art died with them because those simple artisans did not care to convert their mysterious art into a body of objective methods.

11 The Case of Library Science

The branch of knowledge, devoted to library and information theory and practice, is no exception to the aforementioned cycle of theory and practice. This law stands verified by W.C.B. Sayers assertion that "This practice of librarianship long preceded the formation of any law whatsoever."⁴ For thousands of years, local library practices had been evolving slowly and casually. With the Industrial Revolution of the mid-nineteenth century, there came an unprecedented growth of printed matter. Libraries multiplied in number and kind. During his study to librarianship in 1924-25 in U.K., S.R. Ranganathan discovered different libraries at different levels of sophistication and their attitude to library functions and services. The low development stage was very much reflected by the library education. Even at the hands of best of the teachers it was no more than a matter of "take-it-as-such-or-leave-it". This provided the proverbial chaos very much essential to creation.

2 DISCERNING THE LACK OF NORMATIVE LAWS IN LIBRARY SCIENCE

After a great deal of pondering, Ranganathan ascribed all these maladies to the lack of any normative principles for library science. This set the stage; and Ranganathan seemed ordained to precipitate the theory underlying library science—a great and uphill task. Having successfully diagnosed the malady, he set out to prescribe the necessary corrective. It was to formulate the normative principles of library science. This stupendous task could not be executed at a stroke. In July, 1925, he came back

to India to find himself totally obsessed with the overwhelming task of organizing the Madras University Library. This mission drove him to the problem of normative principles to a sub-conscious mind.

3 PERIOD OF GESTATION: THE STORY BEHIND

The absorbing work of organising the Madras University Library provided the necessary first hand experience. It was directly and indirectly helpful. "Every step in the design of the Colon classification, every rule in the formulation of the classified code, and every clause in the drafting of the manual on library administration radiated from and got irradiated by the Normative Principles, hidden away by that pressure, at the sub-conscious level," recalls Ranganathan.⁵

31 *The Zero Hours*

This reinforcing interaction between the not yet crystallised, embryonic normative principles and the experience on the work bench went on for three years, without knowing. He was not getting time to work the laws out. But for the sake of objectivity it was necessary to formulate and enunciate them. By about that time, Ranganathan was invited to deliver vacation lectures in December 1928 at his own University. Ranganathan ambitiously wished to announce the discovery of laws at the time of vacation lectures. This pressure led to the formulation of the following four laws.¹

Every reader his book
Every book its reader
Save the time of the reader
Library is a growing organism

Yet, his uncanny and intuitive insight presaged something missing—something more fundamental. November came; and only a month remained for the scheduled lectures: the most fundamental law still evaded him. His efforts only led him to despair. One evening he shared his struggle with his former mathematics teacher and later a friend, Professor Edward B. Ross. It was one of the blessed moments in library science that this non-librarian, hitting at exactly the crux, spoke to Ranganathan", you mean, 'Books are for use'; you mean that is your first law";

and disappeared from the scene liking a wish granting angel. This story has been narrated by Ranganathan himself with a dramatic interest.⁵ Thus completing the laws, Ranganathan set out then and there to deduce their implications. Conformity of the deductions with the existing practices confirmed their validity. Two lectures on the laws were delivered to a thousand teachers. The laws were again presented in a lecture form before the audience of the First All-Asia Educational Conference held at Varanasi in December, 1930. Ranganathan was the Secretary of its library service section. Implications were worked out in detail ranging from reference service to the library legislation. These five laws of library science were the full subject of a book published with the same title in 1931 by the Madras Library Association. This was *de facto* his first book; and was so popular that over the two years it provoked 21 reviews.⁶ Its second edition came out in 1957 during what he calls the "forced leisure" of his self-imposed exile days in Zurich, Switzerland. The second edition also contained a chapter on scientific method to prove how and to what extent library science is a science. It is an index to its success that there was a demand to produce an American edition of the book.⁶ The third edition revised by his heirs is in the offing.

32 *Identifying their Genuineness*

Ranganathan noted that fortunately the laws thus precipitated were sufficiently simple and looked apparently trivial to form the fundamental laws of library science. If the final formulation seems too obvious, it must not be considered unworthy of any intellectual recognition. The truth lies the other way. Ranganathan was already prepared for this. He declared them to be the Laws of Library Science.

321 *Verification of their Genuineness*

Peter Achinstein, a philosopher of science, sets down the following characteristics for a statement to be described as a 'law'. Laws are essentially general in nature. Their subject is general; syntactically they are general, as they usually begin with "All" "Every" or "No". A law expresses a regularity, which can be used to express and explain other smaller regularities. They are precise; and finally they are simple. Simplicity lies in smallness of number of parameters; and simplicity in the interrelation of these parameters.⁷ How much the "Five Laws" pass

these qualifying tests, is not only obvious, but highly striking. From philosophical and epistemological standpoint, they fully hold the status of a law.

3211 Inherent simplicity. The laws are too simple in appearance as the basic laws are. Neither the laws themselves, nor the concepts for which they stand are completely new. Claiming librarianship as one of the ancient crafts in the world, W.C.B. Sayers, sees that "some of the quite ordinary processes which have now been brought to such perfection that Mr Ranganathan is able to formulate their results as 'law' existed in embryo form in the Assyrian libraries and probably in earlier one."⁴ Therefore, the enunciation of the laws was something which "oft was thought but never so well expressed." To P.S. Sivaswamy Aiyer who wrote the foreword to the first edition of the book (1931), these laws appear so obvious that he "wonders that they were not clearly realised and worked out before."¹¹ Exactly it can be said of any true and great law. When Paulette Crochane (nee Atherton) read these "five statements", it was a reaction of amusement. She smiled and thought "how simple he makes it all sound, when really it is much more complicated."¹² And Ronald C. Bengtson found these laws simple to the point of absurdity.¹³ "At first reading, the five laws may appear somewhat simplistic or self evident. Infact, however, they are profound", writing F.W. Lancaster and R. Mehrotra.²² It only confirms their inbuilt validity as laws.

4 STATUS

In social science a hypothesis is called a normative principle. A hypothesis is formed in the third quadrant of the spiral of scientific method. Ranganathan states that with the aid of intuition a large number of "empirical laws stand boiled to a very small number of fundamental laws."⁸ It thus involves an element of subjectivity in conception, as the laws are intuitively conceived from the cosmos. It is not unusual for the scientists to discover laws with a stroke of intuition, Yet it never discounts their objectivity. This subjectivity is in conceiving them only, otherwise they are fully objective to be grasped by the other intellectuals of all levels. Ranganathan at heart was a positivist, despite the halo of a mystic attributed to him.

41 Nature

In the realm of library science, the authority of the five laws is regal. They are never considered correct or wrong, but only termed as helpful or unhelpful at a given time. These can only be superceded by a better theory. Though they are supreme, but these themselves are subordinated to the general laws of nature such as those of symmetry, impartiality; parsimony, interpretation, least action, and above all the general laws of social sciences, a library being a social agency. In case of conflict between the subordinate laws, they have the power of final arbitration. Ranganathan endows them with the status of "Lord Naryana...ever watchful and ever alert but abstaining from visible intervention *except when the laws of universe are over powered by happenings not anticipated by them*"⁹ (emphasis mine). In short, the laws are our theory and guiding norms; our unified principles applicable every-where in librarianship.

411 What They Stand for ?

These laws are not any statements of opinions, or merely idealised goals of a utopian dreamer. Percy S. Cohen defines normative theories as "which one may aspire; such theories like those of ethics, and aesthetics are often combined with theories of a non-normative nature to constitute ideologies, artistic principles and so on."¹⁰ Thus these are not a statistical average of the actual behaviour either. These are the shared definitions of actual conduct. These laws have been inferred from the actual involvement. His wide experience of observing libraries in action in U.K. and India and the approach and needs of readers are at the very roots of these norms. The enduring value of the normative principles consists in the fact that these are not anything dictated from above, but something precipitated and sifted from within. All the tendencies in the prevailing practices pointed as if "The Books are for use", and so on till the fifth law of library science.

42 Implications of the Laws

Simple though they are, yet they conceal depths in them. They are like a dark horse. Ranganathan once said that in appearance, the laws are like a meak cow, but when the laws leap, they turn out like a ferocious tiger. Mere adoring simplicity does not make any statement a law. And sterile statements are useless even if they underline great relations. The laws above

all should have a dynamic logicodeductive structure. Laws must evince to hold latently or expressedly every practice current and future. A true theory is a repertoire of practices. They should provide the touchstone to assess practices and evaluate the services. Therefore, Ranganathan wished to go further to demonstrate how the library services matched squarely with his laws.

43 Latent Potentials

Being a work of normative nature, rest of Ranganathan's writings seminally flow out of it. Development of Ranganathan's work is only a history of interpreting and tapping the laws. Laws are coaxed to shed their secret to yield theories, principles, canons and corollaries at the lower levels. Ranganathan deducted theories for classification, cataloguing, book selection, reference service, administration, bibliography, documentation, library building and architecture, all out of the five laws. "It looks as if we never see the end of it"¹⁴, i.e., the implications of the laws are infinite. Ranganathan states that "No end can be seen to the number of other such books and papers bringing out more latest implications in the light of changing boundry conditions set to the library service by the continuous as well as sudden changes in social values experienced by society from time to time."¹⁵ Norms are in nutshell the verbal expression of the *Ekavakyata* of library practices. These characteristics of the laws corroborate Bacon's conviction in the *Novum Organum* that "axioms rightly discovered . . . will draw after them train and troops of work."

44 Attestation and Commendation of Their Value

Validity of laws has been attested by time and by various authorities. B.C. Vickery finds in them the code of conduct for the librarians leading to good practices.¹⁶ Dean Jesse H. Shera affirms that the laws wonderfully comply with the American concept of library service. Pauline Crochane, by way of comparison, notes that Dr Shera has been saying the same things in far more words. His words are not as precise and expressive as those of Ranganathan.¹⁷ Dean Shera himself admitted this fact in his Sarada Ranganathan Lecture.¹⁸ Ever since Professor Crochane came across these five short statements, she admits with candour and gratifying sense to have been guided by those laws. Wherever she has taught, she would begin the class by

writing the laws on the blackboard "because they offer her and her students the guidance and the rationale we need when we critically review how we follow the cataloguing practices which prevail, how we evaluate the libraries we use, visit or work in, and how we work to improve the practices we follow and the library services we manage."¹⁹ The antidote to such a bubbling enthusiasms was sought in a Sarada Ranganathan lecture "Putting Knowledge to Work", which elucidates at length the American view of the laws. It could rather be put as the Five Laws at work in America. Lancaster and Mehrotra have demonstrated at length as to how the laws can become basis of evaluating library service.²³ No other society than the American, being a nation of readers, shows the ample implications of the five laws at work. It shows the Five Laws are general and generalizable. They equally apply to any specific kind of library in any specific situation. This is one of the essential characteristics of the norms.

5 PROGNOSTIC VALUE

Not only this, on the laws rests our future hope, for a law is nothing, if it is not prognostic. The prognostic faculty of the five laws has already been proved beyond the shadow of doubt. Many library trends insinuated in the first edition of *Five Laws* (1931) had actually come into vogue when the second edition came out in 1957. New techniques, systems and programmes being introduced for library and information services, are, it seems, to fulfil the one law or the other. G. Bhattacharyya successfully shows that the five laws can provide the interpretive explanation "of the services provided by the SDI." Ranganathan has all the time been saying that the laws are equally applicable to documentation; we simply need to change the parameter "book" to "document". In that context they take the following form: "Documents are for use" to "Documentation centre is a growing organism". With discussion, B.C. Vickery has very ably proved that the laws are also fundamental to documentation.¹⁶ It is not wild to speculate that had Ranganathan lived another decade, he would have supplanted the parameter "document" by "information", endowing them with the formulation: "Information is for use" to "Information centre is a growing organism". It is satisfying that DRTC people have actually done it. It is not simply a matter of trad-

ing words. Rajagopalan and Rajan, have recently elaborated the five laws as applicable to information science. It seems, that the information science has made the value of the five laws quite tangible and their applications more visible. High economic value of information, increasing international cooperation in information services; new and ingenious means for the organization and dissemination of knowledge, increasing use of computers in library and information services reckon on the five laws for their appearance on the library and information scene. International programmes such as UAP, UBC, PGI, MARC, CIP merely exemplify and illustrate simple corollaries of the five laws in a society overwhelmed by the information revolution. The laws therefore exemplify the saying that there is nothing practical like a theory.

And it amply demonstrates that the Five Laws are the source and sum of all the practices of times "past, passing or to come"—the theory indeed.

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1.10 Obsolescence in Ranganathan ?

A.R. SETHI

The process of obsolescence in Ranganathan's writings started during his life-time itself, and he was well aware of it. To postpone its occurrence, he established Sarada Ranganathan Chair and Sarada Ranganathan Endowment as forums for research in the library field. These, however, proved ineffective. Today, the signs of obsolescence are clear and loud: writings 'by' and 'on' him are on the wane; his Codes are being jettisoned; his institutions are languishing; and, his 'men' are on the look-out for greener pastures. Factors responsible for the onset of obsolescence are (i) the end of era of librarianship, (ii) change in values, (iii) vanishing books, (iv) vanishing interpreters and (v) vicious influence of Western propaganda. However, Ranganathan's relevance in three areas is still intact. These are (a) his Terminology and Concepts, (b) his Canons-Principles-Postulates, and above all (c) his Five Laws of Library Science. How these Five Laws lend themselves to new interpretations in such diverse fields as Economics, Politics, Sociology, Law, and Religion, is demonstrated. This International Conference will do well to identify what is obsolete in Ranganathan and which, therefore, may be consigned to oblivion, and what is still relevant which needs to be perpetuated.

Look on my works, ye Mighty, and despair Nothing beside remains,
Round the decay of that colossal wreck, boundless and bare
The lone and level sands stretch far away.

—*Shelley*

1 RANGANATHAN'S LEGACY

After striding the library horizon like a colossus for almost five decades, when Ranganathan finally passed away, he left behind a rich legacy—of ideas, writings, practices, institutions, and *shishyas* (followers) Yet, barely 13 years later, when we set ourselves to taking an inventory of his bequest, all that we come across are the tattered books, jaded techniques, languishing institutions, and astrayed colleagues.

Not very long ago, he was to us an institution in himself, an original thinker of rare merit, inventive genius, master

architect of library science education, builder and organiser of university libraries and library associations in India, and godfather and torchbearer of the library profession. And now we seem to be saying, "We are living in an era of runaway inflation of ideas and techniques. In a situation like this, the individual is of relatively little significance. No matter how imaginative, energetic, and brilliant he may be, time soon catches up with him".

Is Ranganathan obsolete ?

2 OBSOLESCENCE

Obsolescence denotes the tendency of an order turning to disorder. The saying "old order changeth, yielding place to new" provides the philosophical explanation for this tendency. It may occur in two ways: One, when the order is superseded by a higher order; and, two, when the order itself starts disintegrating. Obsolescence is caused by ever-occurring changes in time, space, techniques, and values.

Obsolescence is characterized by three tendencies: It is applicable universally—to men, materials, methods, and ideas; it is a relative phenomenon occurring in the context of time, space and environment; it is irreversible, though it may be put off by providing suitable counter-mechanism.

In the context of an individual, obsolescence may be said to have set in when he/she is out of tune with the times; more specifically, when his/her work and ideology do not provide answers to the problems of the day.

Is Ranganathan obsolete ?

3 OBSOLESCENCE IN RANGANATHAN

Ranganathan was aware of the devouring nature of time and had quivering awareness of the omnipresence of obsolescence. As pointed out by Srivastava, "Ranganathan knew about the limitations of his contributions in relation to the future. Through his work he appears to have melted centuries into one, yet he knew that there was no finality about his works in classification, cataloguing and other areas of Library and Information Science"¹. (He established Sarada Ranganathan Chair in 1955 and the Sarada Ranganathan Endowment in 1963 with the main objective of providing forums for continuing research in

the library science field. The same, however, didn't take-off.) He prefaced his address to the librarians gathered at the DRTC on the occasion of VI All India Seminar of the IASLIC in November 1970 with the remarks, "you are going to listen to an old man with old views. You are young people; it is very difficult for young people to tolerate the old views of old people".² These words articulated his helplessness and despair.

In the later years of his life, we are told, a big volume of his daily mail contained requests from his readers to give afresh or revise his old views on certain topics. However, he had persuaded himself to believe that there was no point in his continuing to write unless the younger generation joined him in the work.³ As a result, while he switched over his attention to abstract ideas, his earlier writings suffered.

Obsolescence crept in at this stage. However, Girja Kumar believes that the creative process stopped in the last years of his (Ranganathan's) life because of the age factor.⁴

31 Signs of Obsolescence in Ranganathan

The rate of obsolescence increased in geographical proportions after his death. By now there are clear and loud signals of obsolescence having set in most of the areas of his contributions. We discuss hereunder some of them:

311 Writings 'by' and 'on' Him are on the Wane

The 'librametric study' of Ranganathan's contributions done by A.K. Dasgupta shows the period around 1950 as the time of his meridian splendour, and the year 1961 as the slackest year.⁵ The period thereafter may be characterized as the period of meandering and repetition. This means that majority of his writings are by now almost quarter of a century old.

As for the writings 'on' or 'about' him, a quick glance at the Cumulative Index of LISA reveals that after 1972, the year of his death, Ranganathan hardly invited any article about him; his CC didn't receive more than 2 articles and CCC not more than 1 article a year. However, there have been sporadic references to his writings all these years as is evident from the Social Science Citation Index.

312 His Codes are being Jettisoned

The libraries practising Colon Classification have been under a great stress since 1960s. These libraries have perhaps coined

more of their own numbers, to accommodate new subjects, than given in the original editions. There are also reports of some libraries changing over to other schemes of classification in exasperation. In spite of assurances, repeated ritually every year, the revised 7th edition is yet to see the light of the day. The CCC is giving way to AACR II in seminars and workshops, if not actually in practice. The Chain Procedure is fading away in the glaze of its own off-shoot, PRECIS. The Three-Card-System has since long been bid farewell in large libraries. The Staff Formula is remembered more out of frustration than by fondness. Ranganathan's caricature of a Reference Librarian being a Rama, Lakshmana, Bharata and Shatrughana—all rolled into one—doesn't fit into to-day's value-framework; librarians would rather 'educate' than 'serve' the readers.

313 *His Institutions are no More Pathfinders*

Among the several institutions established, organised or patronized by Ranganathan, the DRTC and the INSDOC were supposed to act as the torch-bearers of the library profession. And they did discharge their responsibility with aplomb in the initial years. But over the past years they have been vying with one another to be the chief spokesman of the developments taking place outside the country. Their own contribution is coming to nought. The journals issued by them are plagued by delays; even content-wise they have reduced themselves to the status of spreaders of news as compared to the status of creators of knowledge which they once enjoyed.

The contribution of other Departments of Library Science in the country is worth no mention. As for the libraries, it is now difficult to distinguish, quality-wise, libraries with which Ranganathan was associated from the ones which didn't have the benefit of his link. The library associations, once nurtured and patronized by him, have become cess-pools of politics, their offices are now contested like any other political post in the country, with money, soliciting *et. al.* thrown in.

314 *Astrayed Colleagues*

No institution or ideology can thrive if there are no men to sustain it. Ranganathan trained an army of writers according to his own method, so that his books may always remain current even long after his death. He did this in the hope that it will help them to develop into competent authors. "It will also give

me satisfaction that there is some competent young colleague of mine who can take care of the future editions of such of my books as may continue to be of value and in demand.”³⁵ The events after his death prove how misplayed his confidence was.

If there is one area where Ranganathan displayed his naivete, it is in the area of choice of men around him; he mistook sychophancy for competency; obedience was the chief criterion to be in his cortage. This because evident soon after he closed his eyes. While some of these worthies adopted new masters, others became *mathadheesh* themselves; some encashed the cheques of their acquaintances with Ranganathan, others went on the look out for greener pastures. It is for this reason that no progress could be made at any of the frontiers opened by Ranganathan. Thanks to these deserters, we even lost the vintage position we enjoyed on the fronts of classification and cataloguing. By now our dependence on foreign contributions in these two areas is almost total.

32 *Factors of Obsolescence in Ranganathan*

Obsolescence in Ranganathan is the result of both planned and unplanned factors. A brief resume of both types of factors is given below:

³¹² *Age of Librarianship Nearing End*

Why did events like Industrial Revolution, French Revolution, Age of Reason, Bhakti Movement, or Freedom Movement in India, occur at the time they did occur, is a question defying easy explanation. One explanation given for this phenomenon is that events like these are the product of an amalgamation of several forces in operation at that time. Then, was it also the result of some such-like combination of forces that threw up giant classificationists like Dewey, Bliss, Sayers, Ranganathan and Rider during the short span of 100 years (which may now be referred to as the Age of Librarianship)? Perhaps, events like the French Revolution and The Enlightenment had created by the end of 19th century large libraries *sans* organisation. To meet this lacuna, best minds of those times devoted themselves to create schemes which would bring order in the burgeoning libraries of the early twentieth century.

In the case of Ranganathan, there was yet another force goading him. He emerged on the national library scene at a time when India was struggling for independence. He made

libraries as a tool for educating and awakening the masses. However, the force had somewhat spent itself by the time independence was achieved. The age of Librarianship was coming to an end all over the world. A new world order, based on realism and pragmatism, was in the offing.

322 *Change in Values*

The change was all the more pronounced in the arena of value system. "Ranganathan", says T.R. Seshadri, an associate of his, "was born and brought up at a time when spirituality and religion still continued to be the mainsprings of life."⁶ Ranganathan drew his inspiration from religion and Hindu mythology. He made (i) nationalism, (ii) scholarship, (iii) dedication, and (iv) service the four pillars of his edifice. The World War II changed the scenario. There was a shift in emphasis from idealism to realism, from doctrinaireism to pragmatism, from elitism to egalitarianism. Ranganathan was witness to some of these changes; perhaps he didn't try to revise his works because the changes were taking place at a very fast rate, and he was not too sure of the place of his ideas in the changing value system.

323 *Vanishing Books*

A far more serious aspect of Ranganathan's works, apart from their non-revision, is their non-availability in print. The joy and the inspiration that one received by reading Ranganathan's Reference Service or Five Laws of Library Science is available no more to the neophytes in the profession. Perhaps the day is not far off when the students of library science in India may be graduating without having ever looked at the original copies of Ranganathan's works!

One fails to understand the motive behind this artificial scarcity. One wishes there was an Act on the lines of MRTP Act to check the hoarders of knowledge from indulging in unscrupulous acts.

324 *Vanishing Interpreters*

To teach Ranganathan, one has got to be a Ranganathanite. The teachers of yester-years (who were actually practising librarians) made sure that along with knowledge, the feelings of devotion, service and love for books as physical objects were also transmitted to students. Presently the dissecting of the two roles—teacher and librarian has made teaching totally formal.

Students are able to imbibe the letters but not the spirit of Ranganathan's works. The gulf between the neophytes and Ranganathan is on the increase.

325 *Western Propaganda*

If our faith in our own 'products' is getting shaken, it is in no small measure due to the Western propaganda aiming at the Indian information market. Ironically, what Ranganathan gave to the Western world some time back is being offered to us now, albeit in new covers and in sophisticated ways through arranged visits, workshops, seminars, demonstrations, and what have you. "PRECIS, the indexing system devised by Derek Austin for use with the British National Bibliography, owes much to Ranganathan's influence."⁷ AACR-II bears unmistakable imprint of cataloguing principles enunciated in CCC. Recent editions of DDC have borrowed many a feature of CC. "The Library of Congress System (of classification) is showing an increasing use of *syntheses*, which is the combining of notation symbols to create a class number as in a faceted classification."⁸ User Education has incorporated all the essentials of Reference Service.

However, since the 'new' products are sold with aplomb, with lot of salesmanship, persuasion and enticement thrown in, we fall easy prey to them.

4 RANGANATHAN IS STILL RELEVANT

"Ranganathan is to library science what Einstein is to physics".

—Eugene Garfield

Having gone to such lengths to stress that Ranganathan is obsolete, it seems incongruous to consider the preposition: Ranganathan is still relevant. That, however, is the *raison d'être* of this paper.

41 *Areas of Relevance*

We have considered so far the writings, and the techniques and practices developed by Ranganathan. What we have't talked about so far are his:

- (i) Terminology and concepts;
- (ii) *Banons-principles-postulates*; and above all
- (iii) Five Laws of Library Science.

Let us consider their relevance in the modern context.

411 Terminology and Concepts

The greatest contribution of Ranganathan in making Library Science a full-fledged subject is in evolving terminology for it. It is his terminology, consisting of words and phrases, that gave the subject a separate identity. He didn't invent new words; he invested the existing words with new meanings. He borrowed terms from mathematics, physics, biology, chemistry, psychology, management, economics, and of course, religion and philosophy, and cast them in the library mould.

Terms and concepts like facets, mnemonics, isolates, arrays, symbiosis, chain-procedure, classified catalogue, recall value, helpful sequence, rounds and levels, categories, macro-micro documents, devices, etc. come so naturally to us today that it is inconceivable to communicate in library science without their use.

412 Canons-Principles-Postulates

His canons-principles-postulates are both the tools with which to construct the concepts and precepts, as well as the touchstones to judge their soundness. No classification, indexing or cataloguing scheme can be visualised outside the framework of these canons-principles-postulates, degree of applicability notwithstanding. Similarly any existing scheme in these areas can be evaluated with reference to these canons principles. To quote Srivastava, "the approach of analysis and synthesis in classification will always be valid and at no point of time the activities of analysis and synthesis will appear obsolete. CC may meet obsolescence but not Ranganathan's methodologies."⁹ 'Prolegomena to Library Classification' and the Normative Principles of the 'Classified Catalogue Code' have thus assumed a place of permanent value in these two areas. Their relevance is unchallengeable.

413 Five Laws of Library Science

Amongst the innumerable contributions of Ranganathan, none has invited so much acclaim as his Five Laws of Library Science (Books are for use; Every reader his book; Every book its reader; Save the time of the reader; A library is a growing organism). According to Bhattacharya, "these Five Laws constitute a fundamental contribution to the development of library science,

documentation, and information science. They are fundamental because they are relevant in relation to the past of these disciplines, they are relevant in relation to the present day developments of these disciplines, and they will continue to be so in relation to their future development."¹⁰

Pauline Atherton would like the Hall of Fame Award to be given to Ranganathan for his Five Laws alone.¹¹ And rightly so. These Laws represent the best of Indian philosophy and of Indian culture. They have been derived from the source of Indian wisdom, namely the Vedas. They are as much applicable to Library Science as to any other branch of human knowledge or human activity. They cut across all barriers of geography, nationalities, races and cultures.

Peter Heales seems to be speaking of Ranganathan when he describes the work of a philosopher. "The work of a philosopher," says Heales, "is in itself abstract and of little interest to anyone else, but it does produce practical results in everyday life. Activities which impinge on our everyday lives, such as administration, legislation, politics, economics are all influenced, albeit indirectly, by the techniques of thought, analysis and argument developed in the philosophical laboratory."¹²

4131 *New Interpretations of Five Laws*. Let us see how Ranganathan's Five Laws lend themselves to various interpretations in diverse fields.

Resources

First Law	: Resources are for use.
Second Law	: Each person his/her share.
Third Law	: Each resource its optimum use.
Fourth Law	: Conserve the resources.
Fifth Law	: Demand for resources is a growing phenomenon; supply is not

Public Utilities : Railways

First Law	: Railways are for use.
Second Law	: Each passenger his/her seat.
Third Law	: Each seat its passenger.
Fourth Law	: Save the time of passenger.
Fifth Law	: Traffic is a growing organism.

Public Administration

First Law	: State is supreme.
Second Law	: Each citizen his/her rights (and duties)
Third Law	: Equal opportunity for all.

Fourth Law	Protect the citizens.
Fifth Law	Administrative functions continue to grow.

Jurisprudence

First Law	: Law is supreme.
Second Law	: Each person access to law.
Third Law	: Each law its adherents.
Fourth Law	: Save the time (and expense) of litigants.
Fifth Law	: Litigation continues to grow.

Religion

First Law	: God is supreme.
Second Law	: Each person his/her faith.
Third Law	: Each faith its followers
Fourth Law	: Save all forms of life.
Fifth Law	: As sins grow, so does the faith

Society

First Law	: Society is an organised institution.
Second Law	: Each individual his rightful place.
Third Law	: Each social role its rightful operator.
Fourth Law	: Observe the norms of society.
Fifth Law	: Society is a growing organism.

How one wishes that these Laws, and not the 20-point programmes, are made the corner-stone of the state-policy in each country. They are easy to remember, inspiring and beaconing everyone to action.

5 INTERNATIONAL CONFERENCE

We view this International Conference on Ranganathan as the most important event taking place in the field of library science in India after the departure of the great man. For one thing, it has established that Ranganathan still matters to the international community of librarians. Secondly, it has given us the much-needed opportunity to decide, vis-a-vis Ranganathan as to what of him:

- (i) should be jettisoned;
- (ii) should be reviewed in the present-day context; and
- (iii) should be retained and perpetuated.

Today, we need international cooperation in our endeavour to retain and perpetuate Ranganathan in the same manner as we have sought it in the past for preserving our arts, architecture

and archives. This International Conference has to suggest ways to prevent Ranganathan from being a relic or a *piece du art*, because once reduced to that position, he is likely to be smuggled out of this country. We lost Sanskrit, we lost Gandhi. we donot wish to lose Ranganathan.

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SECTION 2

CLASSIFICATION AND SUBJECT ORGANISATION

2 1 Bliss and the Thesaurus: The Bibliographic Classification of H.E. Bliss as a Source of Thesaurus Terms and Structure

JEAN AITCHISON

The second edition of the Bibliographic Classification of H.E. Bliss (BC2), being prepared under the editorship of Jack Mills, Vanda Broughton and others, is a rich source of structure and terminology for thesauri covering different subject fields. The new edition employs facet analysis and is thesaurus compatible. A number of facet based thesauri have drawn upon Bliss for terms and relationships. In two of these thesauri the Bliss Classification was the source of both systematic and alphabetical displays. The DHSS DATA Thesaurus published by the United Kingdom Department of Health and Social Security provides controlled terms and Bliss class numbers for indexing and searching the DASS-DATA database. The ECOT Thesaurus (Educational Courses and Occupations Thesaurus) prepared for the Department of Education and Science, uses the software designed for BSI Root Thesaurus to generate an alphabetical display from the systematic display, derived from the Bliss schedules. Problems, benefits and future prospects of Bliss based thesaurus construction are discussed.

INTRODUCTION

The second edition of the Bliss Bibliographic Classification (BC2) is proving a rich source of terms and structure for thesaurus compilers. This universal classification is being compiled under the editorship of Jack Mills, supported by a team of associates, including Vanda Broughton, Eric Coates and others.

The first edition,¹ published between 1940 and 1943, was the result of the life's work of H.E. Bliss, the originator of the scheme, which was notable for its carefully planned order of the main classes and the provision of alternative treatment for certain subjects. The second edition² aims to develop within the original framework a fully faceted classification. Publication began in 1977 and by 1985 published volumes have appeared for the Introduction and Auxiliary schedules, Class H Anthropology, Human Biology, Health Sciences, Class I Psychology and Psychiatry, Class J Education, Class K Society, Class P Religion and Class Q Social Welfare. Penultimate volumes are available for Class E/G Biological Science, Class R Political Science and Class T Economics and Management. There are early draft for several subject areas including Class A Philosophy, Class AW Statistics and Probability, Class C Chemistry, Class D Astronomy, Class S Law, Class V Arts and Class W Philology: Language and Literature. Work is now in progress on Class AM Mathematics, Class B Physics, Class DH Earth Science, Class L/O History, Class U Technology and the Anterior Numerical Classes 2/9 including Communication and Information.

2 BC2 AS A THESAURUS RESOURCE

BC2 has a number of features which make it thesaurus-compatible and an attractive source for thesaurus compilers.

2.1 Facet Analysis and Thesaurus Compatibility

In facet analysis, which is applied systematically in all the subject field of BC2, concepts are analysed and grouped according to facets. These are manifestations of fundamental categories, such as entities, parts, properties, actions (processes and operations), agents and applications. The facets are then arranged in a logical and predictable order, usually moving from the general to the complex. The arrays of terms within the facets tend to represent fairly simple concepts, similar to those found in thesauri. More complex concepts are built up by synthesising (i.e. combining) class marks from the different facets in a preferred order. In a thesaurus, the indexing terms are also combined to express detailed subjects, but the combination, in post-coordinate systems, does not take place at the indexing stage, but at the search stage. However thesaurus terms may also be com-

bined, as the BC2 class marks, at the indexing stage when used in pre-coordinate printed indexes.

An example of the facets structure of BC2 is found in Class Q Social Welfare, which has among others the facets.

QB Social workers	(Fundamental category-agent)
QC Social Welfare organisations agent)
QD Social work	(.. .. . action)
QE Social services	(.. .. . action)
QG/QZ Social problems	(.. .. . action/entity)

Terms from the facets may be combined to represent a detailed subject, such as:

'Casework by social work term with old people in rural areas'

QBS Social Work Teams (from QB Social workers facet)

QDL Casework (from QD Social work facet)

QEH Rural Social Services (from QE Social services facet)

QKT One-parent families (from QK Social problems-persons-in-need facet)

Combined class: QKT QEH QDL: QBS

(using inverted citation order, i.e. facets filing later in the schedule are cited earlier in class mark)

on using direct retroactive notation, omitting the initial Q in the last 3 class marks . . . QKT EHD LBS

In thesaurus applications, the terms (or the equivalent class marks) may be combined post-coordinately or pre-coordinately as required.

22 *Source of Terminology*

Compilers of thesauri should find the depth of treatment adequate for thesauri in specialised subject fields. The specificity is pitched more toward the periodical than the monograph literature. The treatment of Health Sciences, for example, can compare with that found in Medical Subject Headings (MeSH).³

23 *Source of Thesaural Relationships*

On studying the well-organised BC2 schedules, it is easy to glean information on basic thesaural relationships. This is because each step in the further division of the facets into sub-facets is labelled by a facets indicator. This is a note in parenthesis, showing the characteristic of division used and the

relationship of the terms in the sub-facet to the immediately superordinate term. The thesaurus compiler may easily recognise these relationships and extract them for the thesaurus. The relationships found in the schedules, include the equivalence relationship (synonyms, quasi-synonyms, UF), hierarchical relationships (broader and narrower terms, BT/NT) and associative relationships (related terms, RT). In addition, the schedules contain some scope notes and definitions of terms which may be used in the thesaurus.

231 *Equivalence Relationship*

Equivalence terms are listed in the BC2 schedules, after the preferred term, separated from it by a comma.

EXAMPLE (From Class I Psychology and Psychiatry)

BC2 Schedule

IUR Visual aphasia, alexia, word blindness

Alphabetical thesaurus entry

Alexia

USE Visual aphasia

VISUAL APHASIA

UF Alexia

Word blindness

Word blindness

USE Visual aphasia

232 *Hierarchical Relationship*

Hierarchical relationships are shown in the BC2 schedules by indenting. The hierarchical relationship includes the generic relationship and the whole-part hierarchical relationship.

The generic relationship. This is often preceded in the BC2 schedules by a facet indicator, using the words 'By type'

EXAMPLE. (From Class K Society)

KLM

Groups

KMT

(Types of groups)
Territorial groups

} Generic
relationship

	(Types of territorial groups)	
Q	Allopatric groups	} Generic relationship
R	Synpatric groups	
KMU	Local communities	
KMU I	(By environment areas)	
J	Mobile communities	
O	Neighbourhood groups	
R	Rural communities	
S	Urban communities	

Alphabetical thesaurus entry

Territorial Groups KMT

BT Groups

NT Allopatric groups

Local communities

Mobil communities

Neighbourhood group

Rural communities

Synpatric group

Urban communities

The hierarchical whole-part relationship. This relationship covers a limited number of situations where the name of a part implies the name of its possessing whole in any context. Systems and organs of the body and geographical locations are subject areas where this relationship applies. In the BC2 schedules, Class H Anthropology, Human Biology, Health Sciences, the facet indicator shows when a part of a system or organ of the body is introduced, as opposed to a property or process associated with the system or organ.

EXAMPLE: (From Class H Anthropology, Human Biology, Health Sciences)

HWI Digestivn system

HWO Tongue
HWO BJ (Physiology)

GNG (Surgery)
GNG Glossectomy
H (Pathology)

L (Inflammation) Glossitis

(Parts)

S	Lingual tonsils	} Hierarchical whole-part relationship
U	Mucous membrane of the tongue	
VV	Lingual ducts	
VW	Tip, apex lingua	
VX	Hypoglossitis	}

*Alphabetical thesaurus entry***Tongue HWO**

BT Digestive system

NT Hypoglossitis

Lingual ducts

Lingual tonsils

Mucous membrane (tongue)

Tongue tip

RT Glossectomy

Glossitis

Polyhierarchical relationship Terms which possess polyhierarchical relationships are concepts which belong to more than one category at the same time. These relationships are not regularly shown in the BC2 schedules, although occasionally notes and cross references draw attention to terms linked in this way.

EXAMPLES (From Class R Political Science and Politics)

RI Legislatures and the Legislative process)

— — — — —

(Membership of legislature)

—————

RIK B Legislative leaders

*For Chief executive and ministers,) Cross references to
see Executive RJJ) Polyhierarchical narrow
er terms

RIK C Majority leader

D Minority leader

F Speaker, legislative speaker

Floor leader, leader of the house

233 The Associative Relationship

This is a relationship in which terms are not equivalent and are not hierarchically related. The relationship includes among others, concepts related to their processes and properties, operations or processes and their agents or instruments, an action and the product of the action, the whole-part relationship other

than the hierarchical whole-part, and many others. In the BC2 schedules, recognising associative relationships is aided by the facet indicator.

EXAMPLE: (From Class E/G Biological Science)

EE	Cell	} Concepts related to their processes
EEB B	(Physiology) Cytophysiology	
EEB BP	(Biochemistry) Cell chemistry	
	(Special physiological processes)	
EED DP	(Motility)	
EED DUG	Aggregation (Development & growth)	
IV	Change	
JM	Regeneration	

Alphabetica' thesaurus entry

CELLS EE
 RT Cytophysiology
 CYTOPHYSIOLOGY EEE B
 NT Cell aggregation
 Cell change
 Cell chemistry
 Cell regeneration
 RT CELLS

The BC2 schedules also show occasionally associatively related terms in other schedules or other arrays within the same schedule.

EXAMPLE: (From Class I Psychology and Psychiatry)

IRF Psychiatry
 — — — — —
 ISB Treatment, therapy, curative psychiatry
 — — — — —
 ISF Community mental health
 see also Psychiatric Social Work QES

234 Scope Notes and Definitions

The BC2 schedules contain numerous scope notes and some definitions. These may be transferred to the thesaurus if required.

EXAMPLE: (From Class P Religion
 Class Q Social Welfare)

PXG Magic
 • Ritual acts believed and designed to influence events.

QEE P Positive discrimination

- * Especially favourable treatment of people in need

24 Ease of Updating

Thesaurus compilers are likely to find that the BC2 schedules are hospitable to new concept not enumerated in the published schedules. New concepts may be accommodated by using the synthetic devices, which allow for new concepts to be built up by combining existing class marks. Where synthesis is not possible, the layout of the schedules, well sign-posted by the facet indicators, will guide the thesaurus compiler to the correct location of the new concept, and incidentally, to its thesaural relationships. The semi-ordinal notation used in BC2 is hospitable to additions at any point in the schedules.

25 Some Problems with BC2 as a Thesaurus Source

The substantial benefits of BC2 as a thesaurus source have to be offset by some problems which must be recognised and dealt with. These problems include gaps in coverage, the repetition of identical concepts in several places in the schedules, imprecise terminology and the occurrence of compound terms which break the thesaurus construction standard rules.

251 Gaps in Coverage

This is a problem which will solve itself with time as the schedules for the subject areas not yet covered are completed. The appearance of schedules on Physics, Earth Sciences, Communications and Information and in particular Technology in the next year or so will fill a formidable gap which must have discouraged some possible users from considering BC2 as a thesaurus source. It is to be hoped that revised schedules for some of the early drafts, such as Class S Law will soon also be forthcoming. Thesaurus compilers who have used BC2 as a source over the past decade have had to rely on other sources for these missing subject areas and have now the further problem of deciding whether to bring their thesauri into line with the official Bliss when schedules in these areas are issued.

252 Repetition of Concept and Alternative Places

In BC2 the schedules for each class tend to be self-contained. This may be due partly to the policy of issuing separate, in-

dependent volumes for each subject field as and when compilers with the necessary expert knowledge are available. As a result, individual terms, hierarchies and complete sub-classes are sometimes duplicated in more than one volume of the classification. Radioisotopes, for example, with its hierarchy, appears in both Class C Chemistry and Class H Anthropology, Human Biology, Health Sciences and is likely also to occur in class U Technology. Another example, Handicapped People, occurs, in Class Q Social Welfare, Class I Psychology and Psychiatry, in Class J Education and in Class H under Medical Phenomena by Category of Person.

While the same thesaurus term could be linked to more than one class number, thesaurus compilation is simplified if a preferred place is selected for the concept in the schedules and a cross-reference made, in the form of hierarchical or associative relationships between the preferred and non-preferred location. However, where the term may be considered to have a slightly different meaning in another location, the form of the indexing term is changed to convey this. For example, in the case of Radioisotopes, the general place might be selected as Class C Chemistry, with a qualified form of the term, Medical Radioisotopes at Class H.

In addition to this repetition of concepts, which passes without editorial comment in the schedules, there are the officially recognised alternative places. These alternative places are accompanied by editorial notes and offer choices between locations within the same or different subject fields. For example, in Class J Education, Teachers may be placed under Educational staff at JCP or under Teaching at JHB. In the case of the official alternative, the thesaurus compiler chooses one place, deletes the term from the other and makes hierarchical or associative relationships between the term and the terms at the non-preferred location.

EXAMPLE:

TEACHERS JHB
 BT Educational staff
 RT Teaching

253 Imprecise Terminology

The form of terms in the BC2 schedules is not always sufficiently precise for thesaurus purposes. This is because the exact

meaning of the term is implied by its position in the schedule, and when lifted out of the classification to stand alone as an indexing term it is found to be ambiguous. For thesaurus use, BC2 terms frequently have to be qualified to improve their precision. For example, in Class I Psychology and Psychiatry there are at least four different places for the term Inhibition:

EXAMPLE: (From Class I Psychology and Psychiatry)

ICC	Human psychological process
	(Types of psychological process)
ICN R	<u>Inhibition</u>
ICP	Sensation and perception
ICQ	Stimulus and response
	(Types of response)
ICT O	Feedback
ICT W	Suppression, <u>inhibition</u>
IFK	Cognitive, higher mental processes
IG	Learning
	(Special learning processes)
IGH	Interference
IGH J	<u>Inhibition</u>
IJ	The subconscious & the unconscious
IJK	Subconscious
IJM	Defence mechanisms
Q	Suppression
R	<u>Inhibition</u>

The form of indexing terms in the thesaurus might be:

ICN R	Inhibition
ICT W	Feedback suppression
	UF Feedback inhibition
IGH J	Learning inhibition
IJM R	Inhibition (defence mechanisms)

254 Compound Term Rule Infringement

British Standard 5723⁴ and the revised edition of International Standard 2788⁵ on Thesaurus Construction contain guidelines on when to factor and when to retain compound terms. A problem which arises when translating concept in the BC2 schedules into indexing terms is that the form of compound terms created sometimes break the factoring rules.

Briefly, the three factoring rules are as follows:

Rule a. A term should be factored if the focus is a part or property and the difference is the whole or possessor of that part of property.

EXAMPLE:**HOTEL BEDROOMS**

where BEDROOMS is the part and HOTEL the containing whole

The term should be factored into HOTEL and BEDROOMS

Rule b. A term should be factored if the name of a transitive action is modified by the name of the patient on which the action is performed.

EXAMPLE:**FURNITURE PACKAGING PROCESSES**

where PACKAGING PROCESSES is the transitive action and FURNITURE is the patient of the action

The term should be factored into FURNITURE and PACKAGING PROCESSES

Rule c. A term should be factored if the name of an intransitive action is modified by the performer of the action.

EXAMPLE,**STUDENT ACHIEVEMENT**

where ACHIEVEMENT is the intransitive action and STUDENTS is the performer of the action

The term should be factored into STUDENTS and ACHIEVEMENT

The class mark building devices which aid synthesis in BC2, have a tendency to create class marks having term equivalents which do not conform to the factoring rules of the standards. These are the 'end to' device and the retroactive device.

The 'Add to' device. Using this device class marks from other facets anywhere in the classification may be 'drawn in' to qualify and extend the concepts in a particular facet or array.

Precise instructions are given in the schedules on what characters of the borrowed notation are to be added.

EXAMPLE: (From Class K Society)

KQS Marriage

KQV Married persons

T Working as breadwinner

U Full time worker

V Part time workers

VW Unemployed

KQW Wives

Add to KQW letters S/W following KQV For example
KQW T Working wives

In the example above, the compound term *Working Wives*, resulting from the combination of class marks, does not infringe the compound term rules, but in many instances the 'Add to' device creates compound terms unacceptable to the factoring rules.

EXAMPLE: (From Class R Political Science and Politics)

RMB Political organisational patterns

RMP Democracy

RMS Representative democracy

RMT Political party democracy

RMX One party system

RU Public administration

RUH (Other political context of public administration)

Add to RUH letter H/T following R in RH/RT e.g. public
administration in one-party states RUH MX

The resulting compound terms such as One Party State Public Administration break the factoring rules (specifically rule c). To avoid creating compound class marks and rule-infringing terms, the schedules may be edited for thesaurus use by giving instructions to retain the class marks at RH/RT and RU and their equivalent indexing terms as separate entities. They may then be used independently in indexing and combined at the search stage in post-coordinate systems, as required.

The retroactive device. The BC2 schedules are designed so that class marks may also be synthesised within a single class by using retroactive notation. The schedules are so constructed that concepts that occur later in the schedules may be qualified by those occurring earlier. The earlier class mark is added to the later, without repeating the first, and sometimes also the second character, so that a short notation is created for the synthesised concept.

EXAMPLE: (From Class H Anthropology, Human Biology, Sciences Class Q Social Welfare)

- (a) HCT Protein

 HTU Muscular system

 HTU CT Muscle protein
 (b) QLV Old people

 QM Handicapped people

 QMP Mentally handicapped people

 QMP LV Mentally handicapped old people

This is an ingenious device to ensure logical concept building and brief class marks, but there are times when the resulting indexing terms infringe the rules.

EXAMPLE (From Class Q Social Welfare)

- QEE Day care

 QLV Old people

 QLV EF Old people day care

Where the term Old People Day Care breaks factoring rule b, above. In cases such as this, the thesaurus compiler may decide to edit the schedule to show that class number synthesis is to be avoided and the indexing terms, i.e. Day Care and Old People should not be combined.

In all instances of compound terms extracted from the thesaurus which do not conform to the thesaurus construction rules, the thesaurus compiler has the option of editing the schedules to avoid combination or accepting the terms in the compound form. It may be, that in the special circumstances of a particular thesaurus the compound terms may be acceptable. The standards allow for such exception, where the term is so familiar in a special field that "its expression in separate elements might hinder comprehension".

3 INDIVIDUAL THESAURI USING BC2

BC2 has been used as a source of terms and structure by several thesauri. Most of these were compiled in the United Kingdom. Some used BC2 as one source among many, as was the case of the British Standard Institution's ROOT Thesaurus⁶ the UNESCO Thesaurus⁷ Thesaurus on Youth⁸ and the Community Information Classification and Thesaurus.⁹ However, two thesauri, the DHSS-DATA Thesaurus and the ECOT Thesaurus are derived largely from BC2, and include classified displays based on the BC2 schedules.

4 THE DHSS-DATA THESAURUS

The DHSS-DATA Thesaurus¹⁰ provides a controlled vocabulary for use in the database of the Library of the U.K. Department of Health and Social Security. This database (DHSS-DATA is publicly accessible on two host systems, DATA STAR and SCICON. The thesaurus is based on an in-house version of BC2. The alphabetical thesaurus, published in July 1985, contains terms and relationships drawn from the BC2 schedules. Each preferred term in the alphabetical display carries the equivalent class number in the schedules. The classification schedules proved to be too extensive for publication as they contain more than the 22,000 terms (of which approximately 15,000 are preferred terms) so far selected for the alphabetical thesaurus.

Although the BC2 schedules not Published they provide the DHSS Library staff with a reservoir of terms and relationships for use when updating the alphabetical thesaurus.

Within the DHSS Library the classification schedules are used for the classification and arrangement on shelves of the monograph stock. Class marks are also added to non-monograph items, so that class marks as well as indexing terms may be used in searching the database. A search using class marks is useful when retrieving broad concepts or when a search may not be easily expressed by indexing terms. A search, for example, on the truncated class marks, HLM General Practice, would retrieve most of the documents on the subject of General Practice in the database, avoiding the need for a complicated search program using indexing terms. An example of an even broader search, would be one using the truncated class marks of, which retrieve a large proportion of the documents on Social Security. For bibliography compilation, the output from the search may be sorted into class marks order to ensure an easily achieved logical arrangement.

The alphabetical thesaurus conforms to the international⁵ and British standard⁴ on thesaurus construction. A software management package, STRIDE, was developed by BNF Metals Technology Centre to handle the creation and amendment of the thesaurus and its use online in indexing and searching. The software would allow for a published display of indexing terms arranged in class mark order. This type of display might enhance the subject field overview of the thesaurus and might be included in future editions of the thesaurus. The in-house classification schedules are not yet computerised.

41 Benefits from BC2

411 Structural Control Across a Wide Field

The emphasis of the DHSS-DATA Thesaurus is on health care and social welfare, but it also has to accommodate related subjects in some detail, including management, economics, political science, psychology, science and technology, in particular, construction technology. The classification provides a subject field approach to the terms in the thesaurus displaying the terms and their relationships in each individual area. By scanning the classification, it is possible to assess the

thesaurus coverage in a particular field, and subsequently to rectify gaps errors revealed by this overview.

412 Source of Terms

The in-house BC2 schedules are the main source of terms for the DHSS·DATA Thesaurus. To ensure that the most relevant DHSS terms were built in to the system, the classification incorporates terms originating from the DHSS Library catalogue, abstracts journals and current awareness bulletins and other publications. The richest source of terms for the DHSS Thesaurus are Class Q Social Welfare and Class H Anthropology, Human Biology and Health Sciences. The whole of Class Q Social Welfare and part of Class H have been extended to accommodate DHSS-biased concepts more specific than those found in the published editions. On the other hand, the section of the official Class H concerned with parts of the body and diseases contains more detailed term than are as yet necessary for DHSS use.

Apart from Classes Q and H, the most detailed in-house schedules are those for Class T Economics and Management, Class U-Technology and Class I Psychology and Psychiatry. For subject areas on the peripheral of DHSS interest, for example Class V Arts and Class W/Y Philology, the in-house schedules are no more than outlines. All the in-house schedules, however, may be expanded by referring back to the original schedules, where these exist.

413 Guidance on Relationships

An important benefit is the guidance given by the BC2 schedules on the relationships between indexing terms. As has already been described in para 23 above, thesaurus relationships may easily be discerned from the classified schedules, and include equivalence, hierarchical and associative relationships. Scope notes and definitions contained in the schedules are transferred to the thesaurus when the meaning of the indexing term is likely to be obscure.

414 Ease of Updating

When new terms are to be added to the thesaurus, the classification schedules are checked to see if the term is included in the schedules but not yet selected for the alphabetical

thesaurus. Frequently the term does exist in the in-house modified version of BC2, and the term is selected together with the relationships indicated in the schedules. If the term is not present in the in-house version, the official BC2 schedules are checked, where these exist. Finally, if the term cannot be found in any schedule, it synthesised from existing terms or enumerated in the schedules, the structure of the schedules giving guidance on where the concept might best be located.

42 Problems with BC2 Use

The problems discussed above (para 25) arising when BC2 is used as a thesaurus source occurred in the case of the DHSS Data Thesaurus.

421 Gaps in the Official BC2 Schedules

Work on the DHSS-DATA Thesaurus started as early as 1975, with a pilot social welfare thesaurus, based on Class Q. However the bulk of the work was done between 1977 and 1980, with a further spurt of activity in 1982/83 to expand the construction and engineering schedules. Much of the early compilation work pre-dated the publication of the published volumes and the penultimate volumes and relied on early draft schedules supplied by Jack Mills. There was interaction between the DHSS Library and the BC2 team, resulting in some DHSS concepts in social welfare and health administration finding their way into the official BC2. Where there were no drafts available, for example for Class U Technology, in-house schedules were constructed using the notation allocated in the Third Outline of the scheme, published in the Introductory Volume and using as sources the BSI ROOT Thesaurus, 'Construction Industry Thesaurus'¹¹ and INSPEC Thesaurus¹². As the published and penultimate schedules appeared, the temporary schedules were revised to bring them into line with official BC2. However, official schedules appearing in the future, may not be incorporated into the DHSS version of BC2, as too many of the terms and class marks (in the schedules to be amended) have been used to index the database.

422 Other Problems

Difficulties arising from repetition of concepts in more than one place in the schedules are dealt with in the DHSS in-

house schedules, by selecting a preferred place and making references from the locations not chosen. The preferred place for Handicapped people, for example is in Class Q Social Welfare and not in Class H, I or J. Social psychology is preferred in Class I Psychology and Psychiatry rather than in Class K Society. The preferred place for Physiology is under Human Biology at HBJ. This decision was a logical one since the bias of the database is towards medical sciences. Problems later arose when the thesaurus was used to index another DHSS database, concerned also with general biology, when class makes in the parallel sequence EBB Physiology from Class E/G Biological science would have been more appropriate. This raised the problem of how to distinguish by the form of the indexing term, Physiology in Biological Science schedule and Physiology in the Health Sciences schedule. The use of the qualifier 'Human' with the terms from Class H was one inelegant solution which was not pursued. To reduce the number of compound terms infringing the factoring rules, the schedules were edited so that instructions to build up concepts by combining class numbers using the 'Add to' device were changed to instructions to join the class numbers by a colon when used in monograph classification and to enter the corresponding indexing terms as separate entities. Also the use of the retroactive device, where it would produce unacceptable compound terms was limited by schedule editing, particularly in class Q Social Welfare. In Class H, the occurrence of an excessive number of items starting with 'Hospital' or 'Health Service', most of them breaking the factoring rule, was avoided editing the schedules, so that the necessary detail could be achieved by using some key Hospital and Health Service terms in association with terms in appropriate schedules. For example the term 'Hospital Buildings' may be used in combination with any of the terms in the constructions schedules in Class U. The concept Hospital Assess Routes is expressed by combining 'Hospital Building' HMD with the separate term Access Routes ULB H. Similar editing was carried out to avoid compound terms under Nursing HMW and General Practice HLM and other key areas. In the alphabetical thesaurus the factored term may be sought under the compound form of the term and under each constituent term.

EXAMPLE:

Hospital access routes

USE Hospital building + Access routes

HOSPITAL BUILDINGS + ACCESS ROUTES

HMD : U.I.B H

UF Hospital access routes

FT Access routes + Hospital buildings

ACCESS ROUTES + HOSPITAL BUILDINGS

HMD : ULB P

SF Hospital buildings + Access routes

The code SF (Start Factor) in the entry beginning with the term ACCESS ROUTES directs the user to the main entry for the factored term HOSPITAL BUILDING + ACCESS ROUTES in which the terms are in the Preferred order. The code FT is the reciprocal of SF.

Not all possible factored compound terms are included in the thesaurus, but sufficient to provide examples of recommended procedures.

5 THE ECOT THESAURUS

Another thesaurus which is based on BC2 is the ECOT Thesaurus¹³ (i.e. the Educational Courses and Occupations Thesaurus). This thesaurus was intended to serve as a macro-thesaurus/switching language for United Kingdom databases on educational courses and careers. It originated as an initiative of ECCTIS (Educational Counselling and Credit Transfer Information Service), which needed a thesaurus to access its own database on courses in higher and further education. ECCTIS with the support of the U.K. Department of Education and Science, commissioned a thesaurus, which would be useful for its own database, but also for closely related databases. The work was completed between July 1983 and June 1984. There are approximately 14,000 preferred terms and 9,000 non-preferred included in it. The purpose of the thesaurus was as follows :

(a) To provide a flexible overall structure onto which may be mapped the indexing terms and codes used by cooperating databases.

(b) To provide a single access point to the indexing terms and codes used by the cooperating databases.

(c) To provide a source of terms and relationships which may be drawn by compilers of the thesauri for cooperating databases.

Since information on courses and occupations occur in all fields of knowledge, a universal classification system was needed to provide a neutral structure on which to build the macrothesaurus. BC2 seemed well suited to this purpose because of its depth of detail and thesaurus compatible structure. The Bliss Association were approached and gave permission to use the BC2 structure and notation in the ECOT Thesaurus.

51 *Depth of Coverage and Selection of Terms*

The aim was to achieve a level of specificity in educational course information sufficient to index the content description of the courses. For careers and occupations the specificity needed was to match the detail at the unit group level of the Classification of Occupations and Directory of Occupational Titles (CODOT), published by the U.K. Manpower Services Commission. When selecting terms for educational courses the BC2 terminology was usually as specific as necessary for content indexing but at times proved over specific. Where depth of treatment was more than sufficient for the ECOT Thesaurus, less significant terms in an array were not given preferred term status but demoted to entry points, leading into the top term in the array. Other terms of less importance were merely mentioned in the scope notes or ignored altogether. These rejected terms are nevertheless all available for selection should they be needed at a later date.

EXAMPLE: (From Class R Political Science and Politics)

<i>Official schedules</i>	<i>Terms selected</i>
RAU	Political processes ----- -----
RBC E	Change.....Selected as preferred term -----
M	Crises..... Ignored
N	Development.....Selected as preferred term -----
Q	Progress.....Mentioned in scope note
QR	Reform.....Mentioned in scope note
QX	Decline.....Selected as entry point
R	Reorganisation..... Selected as entry point

ECOT schedules

RBC F	Political change SN Includes Political reform, political progress UF Political decline Political reorganisation
RBC N	Political development

Selection procedures for occupations were as follows. Where the occupation was given a class mark in BC2, for example, Social Workers QB in Class Q Social Welfare and Local Government officers RXO J in Class R Political Science, these terms and class marks were selected for the thesaurus. More frequently the actual occupation was not found to be enumerated, but the class mark was built up by adding notation from schedule 4A 'Persons in the subject'. Using this device, operations, equipment, disciplines etc. were further defined to specify the precise occupation.

EXAMPLE:

- | | | |
|-------|-------------|-------------------------------------|
| (a) | THO PDT | Average adjusting
(Personnel) |
| | THQ FDT 4A | Average adjusters |
| (b) | VYB AG | Theatre management
(Personnel) |
| | VYB AG4 A | Theatre managers |
| (c) | UES TG | Galvanizing
(Personnel) |
| | UES TG4 A | Galvanizers |
| <hr/> | | |
| (d) | UFD GCD | Open hearth furnaces
(Personnel) |
| | UFD GCD 4 A | Open hearth furnace operators |
| <hr/> | | |
| (e) | EGF | Palaeontology
(Personnel) |
| | EGE 4 A | Paleaontologists |

Where it was necessary to distinguish between different levels of personnel at one location, the appropriate class marks in schedule 4A were used :

EXAMPLE:

- | | |
|---------|---------------------------------|
| UFI | Glass technology
(Personnel) |
| UFI 4A | Glass technology personnel |
| UFI 4UJ | Chemists (glass) |
| UFI 4UK | Glass technologists |
| UFI 4UR | Foremen (glass technology) |
| UFI 4V | Glass workers |

The occupation was always played in the most specific location in the schedules, with links to generic occurring earlier

in the schedules, or in other schedules, using the *BT/*NT relationship.

EXAMPLE

VZF	Sport

	(Personnel)
VZF 4A	Sports personnel

	*NT Sports managers VZF N4A

	(Management)
VZI N	Sports management
	(Personnel)
VZF N4A	Sports managers
	*BT Sports personnel VZF 4 A
	*NT Sports Centre managers VZF PN4 A

	(Facilities)
VZI P	Sports facilities
VZF PN	Sports centres
	(Personnel)
VZF PN4 A	Sports centres managers
	BT Sports managers VZF N4A

Note the concept Sports Centre Managers is collected with Sports Centres, at the most specific location, rather than under Sports Manager or Sports Personnel, but the polyhierarchical link is made via *BT/*NT codes

52 Thesaurus Presentation and Display

Unlike the DHSS-DATA Thesaurus, where only the alphabetical display is computerised and published, both parts of the ECOT Thesaurus are in machine-readable form, with the intention that both parts will eventually be published. At the moment, the alphabetical display is available in computer print out and on microfilm, and the classified section in computer print-out only.

The classified display consists of the BC2-based schedules set out in the style of the BSI ROOT Thesaurus⁶ using the ROOT software, developed by Hutton+Rostron Data Processing Limited. The display shows by indenting and typographical changes the main hierarchical and associative relationships between terms. Equivalent terms are also shown under the preferred terms preceded by the code UF. Scope notes are

shown in the schedules preceded by the code SN. The code RT against associative relationships indicated by indenting in the schedule, distinguishes these from hierarchical relationships also shown by indenting. This code will not be printed out in the published schedules, but is needed in the creation of the alphabetical thesaurus from the classified display. The classified display also includes cross-references to broader, narrower and related terms in other subject areas or in other parts of the same subject field. The reference codes *BT/*NT/**RT precede the terms. Each term is followed by the class mark where it is located in the schedules.

The display also gives codes against the terms to indicate which cooperating database uses them. For example ECC represents ECCTIS and MAR represents MARIS (Materials and Resources Information Service). Codes are also included for the source of the term, for example CODOT.

EXAMPLE:

DI	Geophysics
	UF EEC
	MAR
	(Personnel)
DI4 A	Geophysicists
	UF CODOT 213.75

522 The Alphabetical Display

This part of the thesaurus provides access to the classified display via the notation. It may also be used independently of the classified display as a conventionally arranged alphabetical thesaurus. The alphabetical thesaurus is derived from the classified display by the ROOT program. The display consists of the indexing terms reorganised into alphabetical order and giving under the preferred term, the following information: codes for cooperating databases, scope notes, equivalent terms broader, narrower and related terms derived from the intended information in the classified display, and followed by a second sequence of *BT/NT/RT relationships preceded by an asterisk.

53 Problems

As with the DHSS-DATA Thesaurus there were problems to be resolved when using the BC2 schedules as the basis of the thesaurus.

531 *Gaps in Coverage*

At the time of compilation a number of BC2 volumes were published or in penultimate draft form, but there were still a number of gaps in subject coverage for which there were no drafts at all. The absence of schedules for Class U Technology meant that schedules, using the notation in the Third outline, were devised drawing mainly on the BSI ROOT schedules for terminology and relationships. Similarly, non-official BC2 schedules were created for the Earth Sciences, drawing on the Broad System of Ordering¹⁴, the BSI ROOT Thesaurus, UNESCO Thesaurus⁷ and other thesauri. A schedule for the anterior numerical classes 2/9 was developed which incorporated the auxiliary schedules, giving these main class status and included a Communications and Information schedule expanded from an early draft supplied by Jack Mills.

532 *Other Problems*

The same problems which arose in the compilation of the DHSS-DATA Thesaurus, occurred also in the ECOTT hesaurus and were resolved in a similar way. Where an identical concept appeared in more than one place in the schedules, a preferred place was chosen and cross-references made. The problem of term ambiguity was overcome by adding an appropriate qualifier to the indexing terms selected. Some compound terms, unacceptable to the standards were avoided by limiting the use of the 'Add to' and retroactive device. However, the ECOI Thesaurus does include a number of compound terms infringing the factories rules, because of its need to match the specificity of the terms in the CO OT classification. For example 'Textile repairing' 'Weld testing' which break factoring rule b.

6 CONCLUSIONS

BC2 should not be overlooked as a useful resource by thesaurists compilers. It contains a prolific store of relevant terms, displayed in such a way that the basic thesaural relationships between them are explicit. BC2 may be used as one among many sources or as the major source for a particular thesaurus. It is equally useful when giving structural control to a thesaurus covering a wide field to one covering a specific

field in depth. The resulting thesaurus may be a purely alphabetical one, or the classification schedules may be incorporated, as a systematic display to complement the alphabetical section. Although it should be realised that some editing of the BC2 schedules must be undertaken to develop from them a thesaurus to meet standard requirements, the amount of effort involved should prove worthwhile. The gaps in coverage, once an important disadvantage, are now gradually diminishing, so that in the future the number of thesauri drawing upon BC2 as a fount of terminology and structure is likely to increase.

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2.2 Ranganathan's Idea of Facet Analysis in Action

F.J. DEVADASON

One of the most significant contributions of Ranganathan is his technique of facet analysis and the associated theory of analytico-synthetic classification. This paper indicates some of the recent applications of facet analysis in (1) design of faceted classification schemes, (2) design of new subject indexing systems, (3) creation of vocabulary control tools such as thesaurus and classaurus, (4) computer based bibliographic searching and (5) computer based data systems. Points out that there has been a resurgence of facet analysis and indicates that the POP-1 system, CIFT system, Classaurus and Computer Generation of different kinds of subject index entries from a single input string formulated according to postulates, are all innovations based on facet analysis.

1 INTRODUCTION

One of the significant contributions of Dr. S.R. Ranganathan is his system of Facet Analysis and the Theory of Analytico-synthetic Classification based on postulates and principles. "The procedure was laid down in the 'Library classification: Fundamentals and procedure, Madras, 1944'. The same book has gone further and reduced the facets themselves to the five Fundamental Elements :—Time, Space, Energy, Matter and Personality."¹ His first account of the five Fundamental Categories that underlie the division of any subject or discipline was incorporated in the 4th edition of his Colon Classification. His system of facet analysis based on the Fundamental Categories paved the way for the development of faceted classification schemes and new index languages in Britain and Europe in the 1950s and 1960's.

According to Foskett, "Ranganathan was the first to develop a true theory of analytico-synthetic classification, and his system of facet analysis went so far to meet the needs of ordering and indexing the complex subjects of modern documentation, that it has passed into the common stock of

professional knowledge, and many people who now speak confidently of facet analysis have never heard of Ranganathan."² Though Foskett may be right, experiments and research are being carried out on the use of facet analysis and systems are being implemented which are based on facet analysis. For instance, the International Documentation in Chemistry (IDC) system of Fugmann^{3,4} is a system of excellence that bears testimony to the use of facet analysis in computer based bibliographic information system.

2 FACET ANALYSIS

The concept of 'facet' is a bit difficult to understand. Studies have been carried out recently too on the concept of facet.^{5, 6, 7} Ranganathan considered the denotation of the term to be different depending on the context. At least there are two such denotations. Firstly, in the context of a scheme for classification, "the totality of the divisions of a Basic Class based on a single train of characteristics is said to constitute one of its facets." Secondly, "in a class number, the part of it corresponding to a single train of characteristics is said to be one of its facets."⁸ A facet has been taken to be the totality of one division of a Basic Class based on a single train of characteristics as well as one component of a class number or of a compound subject corresponding to such a division. It has been taken as "a generic term used to denote any component—be it a basic subject or an isolate—of a Compound Subject and also its respective ranked forms, terms and number."⁹

But it should be noted that Ranganathan himself has stated that "Each facet of any subject as well as each focus in it is regarded as a manifestation of one of five Fundamental Categories."⁸ p. 125 "Each facet of any subject can be deemed to be a manifestation of one and only one of the Five Fundamental Categories—Personality, Matter, Energy, Space and Time. We may call a facet a general manifestation, and focus in it a particular manifestation, of the fundamental category concerned."¹⁰ In fact, the concept of facet should be taken to be operative only with respect to the concept of Fundamental Categories and of Basic Subject or Discipline. A facet is the totality of ideas 'falling in' or 'belonging to' any one of the

Fundamental Categories and of the Basic Subject. A single manifestation of any one of the Fundamental Categories or of the Basic Subject is an 'instance' or 'occurrence' of the respective facet. This 'instance' or 'occurrence' or 'manifestation' has been denoted by the term 'focus'¹¹ though the term 'facet' has also been used earlier to denote a manifestation or occurrence of the Fundamental Categories and of the Basic Subject.¹²

According to Ranganathan, there are only five facets : Personality, Matter, Energy, Space and Time; to which we can add the Basic Facet or the Discipline Facet. These have been abstracted and interpreted recently to be contained in the four facets or Elementary (fundamental) Categories : Discipline, Entity, Property and Action.^{13, 14, 15, 16, 17} Facet analysis, therefore, consists in analysing the concepts in the given representation of a subject so as to identify the Elementary Categories or Facets to which each one of them belong and sequencing the concepts according to certain rules of syntax given with respect to the the Elementary Categories.

3 FACET ANALYSIS AND CLASSIFICATION

The role of facet analysis in the design of classification schemes is well known and several faceted classification schemes have been developed in Britain and Europe. But the recognition of the usefulness of the concept of facet analysis is of recent origin in North America. One of the best examples of the use of the concept of facet analysis in designing faceted classification schemes is the US Energy Information Administration's Classification Scheme for Energy Data, using eight facets.¹⁸ A detailed account of the facets and their derivation based on Ranganathan's Fundamental Categories has been discussed by Batty and Travis.¹⁹

Another faceted classification scheme has been developed by Peter Glickert of the Chemical Classification Division, US Patent and Trade Marks Office, for entirely a different purpose—to identify volunteers (consultants) on about 2000 topics whose services are made available to about 65,000 members. It is of interest to note that at least 2 questions per month is on how the system is classified.²⁰ Though the scheme is not based on any Fundamental or Elementary Categories, it is of

interest to note the "creeping facetism"²⁰ p. 203 realised and recognised to be useful and inevitable.

4 FACET ANALYSIS AND SUBJECT INDEXING

The use of facet analysis for subject indexing have been discussed by Ranganathan in 1964¹² p. 109-119. He has discussed how facet analysis can be used for chain indexing without the help of any classification scheme. In fact, PRECIS²¹ is a subject indexing system based on facet analysis, though it has not been acknowledged explicitly.

The Postulate-based Permuted Subject Indexing (POPSI) system has been explicitly stated to be based on and evolved out of, facet analysis. The first exhaustive discussion of the POPSI system starts by citing Ranganathan's work¹² on "subject heading and facet analysis"¹³, p. 1. It postulates that there are four Elementary Categories namely, Discipline, Entity, Property and Action and also a special component called Modifier constituting the 'Deep Structure of Subject Indexing Languages' ¹³ p. 24-25 ; ¹⁵ p. 12. It also makes use of the concepts of "Base" and "Core" to be used as the first context—specifying category and second context—specifying category to enable 'need-oriented' indexing¹⁶ ¹⁷. Some of the significant contributions of POPSI are :

1. The concept of 'Rounds' of Ranganathan is easily handled by the syntax rule that both 'Property' and 'Action' can go directly with any other Elementary Category including another Property and/or Action ¹⁶ p. 245-46.

2. The subject headings with suitable indicator digits for Elementary Categories and other subdivisions when arranged alphanumerically produce an 'organizing classification effect'.²²

3. Apart from producing different 'organizing classification effects' to suit the need by modifying the indicator codes, it is possible to change the first and subsequent categories to produce specific versions of indexes to suit the need. This is achieved by using the concepts 'Base' and 'Core'²² p. 14, 16, 17 enabling the indexer to be the designer of his own indexing system.

4. There is no need for providing 'ascending' and

'descending' *See also* Cross Reference entries unlike in other indexing systems^{23, 24}.

5. The vocabulary control tool for use with the system called 'Classaurus' can be created along with the indexing work^{15, p. 14, 17, 25}.

A computer based subject indexing system has been developed based on the Deep Structure of Subject Indexing Languages,^{23, 24, 26}. The system is capable of generating several different types of subject index entries including chain index entries and PRECIS—format entries automatically, from a single input heading. The vocabulary control tool Classaurus has also been shown to be amenable for computerisation.^{22, 27} (See also Section 4).

Another recent indexing system based on facet analysis is the "Contextual Indexing and Faceted Taxonomic Access System" (CIFT) of Anderson and others^{28, 29}. The idea of POPSI, allowing the change in the sequence of categories (using the concepts of Base and Core) for producing specific need-oriented indexing (sub) systems have been fully exploited in CIFT—to produce 'classified arrays as well as alphabetical indexes' and the order of descriptors in contextual strings being determined differently depending on the need. Conceptually CIFT is closer to the POPSI system. The system has a thesaurus to make sure that the facet assigned in indexing matches the one given in the thesaurus. The system uses a set of facet codes which are used by the computer program to 'order the classified and alphabetical indexes'. It is interesting to note that in classaurus too, the terms have the code to denote the Elementary Category to which they belong.^{22, 27}

5 FACET ANALYSIS AND VOCABULARY CONTROL

The concept of facet analysis has been found useful in designing and structuring vocabulary control tools such as thesaurus. "The tree structure of MeEH is a simple and well-known example, now followed in other index languages, for example TEST and FRIC (until the most recent edition). Barhydt's 'Information retrieval thesaurus of education terms' is a detailed and explicit example of the use of facet analysis."³⁰ Batty has developed a system for a US House of Representa-

tives Subcommittee, using a simple controlled vocabulary contained in five facets.

Subject headings formulated according to Ranganathan's facet analysis have been used for computer aided construction of thesaurus.³¹ Based on the analysis of subjects according to the POPSI system, a system for generating thesaurus using computer has been designed.³² A new vocabulary control and indexing tool called "classaurus" has been developed based on analysis of subjects according to the POPSI system. It is a faceted systematic scheme of terms with vocabulary control features.^{34, 15, 25} A methodology for the design of a species classaurus called 'Alphabetic Classaurus', using computers has also been developed.²⁷ One of the problems associated with such vocabulary control tools is that they become absolute soon.³³ This has been overcome by designing a system for online construction and updating of the 'alphabetic classaurus'. Both the Systematic Part and the Alphabetic Index Part of the classaurus are kept as direct access files for online access and on-the-spot updating with 'updating while indexing' feature enabling the classaurus to be kept always up-to-date.²² p. 11-26

6 FACET ANALYSIS AND COMPUTERISED SEARCHING

A computer based information retrieval system has been developed at the US Energy Information Administration Department using a faceted classification scheme as the interface.³⁴ The faceted classification scheme specially developed for the purpose, translates natural language wording of data element names on forms, into a controlled vocabulary and grammar. This translation supports online post coordinate search and detailed comparison of data elements. In order to make the facet analysis based information system acceptable to the American users, the designers have taken the following precautions :

1. Though the system is capable of producing classified displays and print-outs, classified lists are not produced. This is because of the fact that classified catalogues are unknown in the US, not only to the public, but also to most information professionals.³⁴ p. 373

2. The notation used in the system has been suppressed in

the retrieval interface. Though notation has been found to serve many useful functions it has been found to be not user friendly³⁴, p. 273

3. The professional vocabulary has been changed to de-emphasise classification terminology in the user manuals.³⁴, p. 275

The use of facet analysis in formulating search queries and user query profiles for searching computer based bibliographic data bases has been well recognized.³⁵ ³⁶ In order to make the search query explicit and to formulate the topic of the search precisely, specific questions guided by facet analysis such as, what things, what materials, which properties, operations and agents are involved are to be asked.³⁷ A common methodology for developing a search query profile using facet analysis as the primary technique has been developed.³⁸ Research into the search strategies of "operationalist searches" and "conceptualist searchers" has also been carried out to bring out the role of facet analysis³⁹ ⁴⁰ in online bibliographic searching styles.

7 FACET ANALYSIS AND DATA SYSTEMS

Facet analysis and the theory of faceted classification have been found to have great potential in indexing, retrieval and also as an aid to statistical data description. Many data analysts have been found to be fascinated by modern theory of faceted classification, if they are exposed to it. The quality of statistical analysis is heavily, though not exclusively dependent on finding reasonable ways to classify data.⁴¹ It has been found that the facets provide a checklist to ensure complete and consistent headings for data elements, while the classificationists' "mutually exclusive and exhasustive" classes are a necessary condition for additivity of numerical data.³⁴ According to Traws, the theory of analytico-synthetic classification not only can help in the rigorous construction of categories, but they can also help build a framework for comparing statistics. Facet analysis has also been found to help isolate differences between similar kinds of data. "The facet categories serve as an artificial grammar for the data, and can help the analyst achieves a more rigorous

categorization and one that is more compatible with other data system."⁴¹

8 CONCLUSION

The use of facet analysis in information handling is paramount.^{3, 4} Its role has been brought out by Batty: "Facet analysis offers a sophisticated but easily transferable model to help analyse unfamiliar, sometimes complex, often non-traditional areas of information. It guides the development of coherent clusters and subclusters of concepts and terms, for easier examination and organization. It increases the speed and effectiveness of index language development and adaptation, and the speed, effectiveness and ease of practical indexing. It provides an algorithmic base that eases and speeds up the formulation of search statements and search strategies."³⁰ p. 342 There has been a resurgence of facet analysis according to Batty. But the development of new subject indexing languages like POPSI and CIFT, development of computer based system for generating several different types of subject indexes from a single subject heading formulated on the basis of analytical techniques evolved from facet analysis, development of computer based system for generating information retrieval thesaurus using as input subject headings prepared according to facet analysis, development of new vocabulary control tools such as Classaurus and online systems for creating and maintaining it upto date, and the development of computer based information retrieval systems based on faceted classification scheme, indicate that there have been attempts not only to resurrect facet analysis but also to innovate and find new applications of facet analysis.

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2.3 The "Personality" of the Personality Facet

D.J. FOSKETT

Explains the concept of personality as it forms the basis and focus of all other fundamental categories and Dr Ranganathan's views on the subject. Analyses views of Dr Golier, CRG members, Coates, Foskett (author) and Vickery on Personality and relating General System Theory (GST) to classification. Concludes that although Dr Ranganathan's statement that "Personality is what remains when other facets have been identified" is not satisfactory but in the light of GST personality of personality facet makes a significant contribution to the theory and practice of library classification.

In any review of Ranganathan's many contributions to the art and science of Librarianship and Information Science, classification must hold a high place. The Colon Classification itself, for one reason and another, has not achieved widespread use outside India, but the theoretical basis, in the words of Norman Roberts, "embodies ideas and principles of immense and fertile influence."¹ These ideas have certainly found practical application in many specialist systems for various organisations, notably in industry, and in particular through the work of the Classification Research Group in Britain, in Europe and even in the USA. The concept of "facet analysis" now holds a significant place in the revisions of the Decimal Classification itself.

It is well known that Ranganathan's original idea of facet analysis was based on the notion of "fundamental categories" of ideas which represented events and phenomena in the physical world. Most people have found no difficulty in accepting the concepts of Time, Space, Energy and Matter; indeed, they appear in various forms in the writings of philosophers of all ages, from Aristotle to Engels. I am at a loss to understand why some critics, such as Roberts and R. Moss², should count it against Ranganathan and facet analysis that he too should find them useful in classification. Together with Ranganathan's own *Prolegomena*, probably the best account

has been given by Brian Vickery in his *Classification and Indexing in Science*.

The commentators, however, are worried most of all by the concept of "Personality". This was much of an intuitively-derived category, and Ranganathan never really provided a detailed and convincing explanation. Two quotations will suffice to demonstrate his difficulty.

The fifth fundamental category Personality, which has to be used in a very generalised sense as stated above, is unanalysable. We have to treat it gently and as a whole. It is the most concrete category.

Philosophy of library classification⁴

Without personality there can be no organ, constituent, attribute, action, reaction, or incidence in space or time. Personality forms the basis, the host, the locus of all other fundamental categories.

Prolegomena to library classification⁵

And in a seminar given at Rutgers University⁶ he stated that Personality is what is left of a subject after Matter, Energy, Space and Time have been indentified. By then, he had come to rely on the postulational approach, and responded to criticism so far as to stress that "the fundamental categories are not to be regarded as objectively true, but merely as 'helpful to the system'".

The earliest specific criticism of P was probably that of Eric de Grolier, in his Unesco study of general categories⁷ :

'Personality' has no theoretical value; it is simply a label placed on one or more characteristics selected more or less arbitrarily to form hierarchical divisions of the highest order in a classification which seeks to express different points of view.

De Grolier considered that an examination of the Main Classes in CC shows no more than *a posteriori* standardisation of a purely practical method, and that it is useless to look for a general category with some real existence in Ranganathan's scheme. Roberts agrees, believing that De Grolier's criticisms

of fundamental categories are irrefutable and that CC should be rescued from a barren ideology. In spite of all this, those members of the CRG who have been practitioners in making classification schemes and thesauri have all relied on facet analysis; and even where, in many instances, they have rejected the limitation to 5 categories, they have nevertheless borne them in mind as guidelines rather than as dogmas, "helpful to the system".

Such criticisms do not prevent philosophers and system-builders from continuing to search for general principles which have a wide range of manifestations over many fields of study. A basic tool in this intellectual enterprise is classification, and its function is to make sense of events and phenomena in the world outside ourselves, so that we may identify (or impose) some order which will enhance our understanding. In classification, Ranganathan's concepts have such impressive success that it seems very worthwhile to go on analysing them. For while it is true that both Melvil Dewey and H.E. Bliss recognised the principle of synthetic classification, Ranganathan's creative leap was to suggest a method of generalising the principle from simple number-building into a formula which would be applicable within classes as well as between them.

The CRG members, having applied facet analysis to many schemes for specialist subjects, came to realise that a great deal of humdrum work was involved in the process of identifying and enumerating terms from marginal fields, and so turned their attention to a more general approach. This immediately led to a search for means other than postulational for specifying Main Classes. They found a fruitful line of thought in the theory of integrative levels⁸, which offered a basis which was recognised by scientists in many fields, for the construction of a scheme for a series of entities exhibiting increasing complexity of organisation, each level developing out of the previous through the incorporation of new entities and new relations between them. Thus atoms combine to form molecules, molecules masses, and so on. As each higher level produced a set of new entities, it seemed reasonable to suggest that these entities might well form the P facet of a new Main Class. This notion has already borne some fruit in influencing the new edition of the Bliss Bibliographic Classification and

the Broad System of Ordering⁹.

So far, CRG's attention had been directed towards levels of entities of increasingly complex organisation, and the relationships that characterised them, both internally between their constituent elements—the lower level entities—and between them and the world around them—the environment which they inhabited.—A more wide ranging theory was needed to explain the relationships between the classes.

In my first paper on "Classification and integrative levels," circulated in draft to the CRG in 1959, I had already drawn attention to an early paper by Ludwing von Bertalanffy, "An outline of general system theory,"¹⁰ and when his major book was published, it provided a much more detailed basis for the further exploration of these ideas.¹¹ This I began in a review article,¹² in which I sought to show how General System Theory might profitably be applied to the organisation of Library and Information Services from three major aspects: (1) the information function; (2) the technical or hardware side; and (3) the concept of LIS as itself a system. I did not, then, further explore the path of relating GST to classification.

Bertalanffy's own description of GST was "a scientific exploration of 'wholes' and 'wholeness', which, not so long ago, were considered to be metaphysical notions transcending the boundaries of science". And later, he went on to describe its subject matter as "formulation of principles that are valid for 'systems' in general, whatever the nature of their component elements and the relations and forces between them". He demonstrated the application of this generalised theory to mathematics, physics, and biology, then to psychology; and phychiatry; his final chapter, "The Relativity of Categories", discusses the relation between the categories of experience and thinking of the individual person and the cultural and linguistic influences which bear upon him.

Bertalanffy was followed shortly afterwards by Eem Laszlo, who had also been pursuing similar lines of thought, via Whitehead's organic philosophy, and he gave his book, *Introduction to Systems Philosophy*¹³, the sub-title, "Towards a new paradigm of contemporary thought". In it, he applied GST to the traditional problems of philosophy: ontology, philosophy of nature, mind and ethics.

These are only two, even if two of the most important, of the many contributions to the literature of GST, and there is no doubt that it constitutes a significant influence on contemporary thought. Since I believe that a scheme of classification ought to reflect, and wherever possible anticipate, the ways in which specialists think and write about their subjects, it seems to me important that we should recognise the affinity between GST and Ranganathan's theory of fundamental categories. It is to be regretted that Moss and Roberts had not had the advantage of a study of GST before their criticisms of the P facet were made public.

Ranganathan never referred to GST in his writings, and in discussion he was inclined to minimise the relevance of integrative level theory to the problem of Main Classes. He remained content to rely on the postulational approach, having, as he said, "only one lifetime, and more important questions to answer". I am sure that he had an intuitive understanding of GST, though; for example, when taxed on the definition of P he sometimes used the phrase "whole as an egg", to describe the way he recognised the P terms which came out in any particular class. As clearly had the Bertalanffy concept of "wholeness" in his mind when constructing P facets, even though he did not choose to spend time on a thorough investigation of their philosophical basis.

Our understanding of our environment, the world in which we live, grows not merely by observation but also by reacting and interacting with the events and phenomena we meet in this world; in his nicely lucid account of the philosophy of natural science, Ian Hacking has the useful phrase, "Representing and intervening" to denote these aspects¹⁴. We are able to represent the world to ourselves initially through our observations; we try to make sense of these observations by fitting them into some sort of mental construct which improves our understanding of what is happening. We enlarge our range of constructs by testing our conclusions, that is by carrying out activities designed to bring about new events and phenomena, to see whether or not they justify us in thinking that our representations are in fact correct. This, in simplified terms, is what we actually do. Philosophers have always disagreed about the purpose of these operations, the validity of our conclusions, whether or not our personal thoughts

correspond to reality and truth, whether there is such a thing as a reality out there, and so fourth. But there is virtually no such disagreement about what we actually do.

The progress of humanity depends on the communication of ideas about the world, and libraries are the institutions where these communications are stored and made available. They are the social memory of mankind; Ranganathan himself used the term "externalised memory". A great deal of research and experiment has gone on during the last century or two on the way in which the memory functions and, again in simplified terms, the two major aspects are like convergent and divergent thinking. The first brings together information and focuses it on a specific topic, while the second looks outwards from a specific topic to try to find similar characteristics in other topics. Both serve to enhance understanding of one area of reality by comparing it with others. All research agrees that the memory cannot function unless the information it receives is incorporated, or assimilated, into some kind of conceptual structure, or classification.

The library, as a social memory, likewise needs a scheme of classification if the information stored in it is to make sense to its potential users. The same applies to any store of information, including computerised data bases, even though their advocates may not realise the fact. Recent publications in the USA indicate that even the Americans may be slowly and reluctantly discovering this. See, for example, the article "Relational thesauri in information retrieval": the authors have actually discovered that a thesaurus which links terms through relationships like hierarchies helps the enquirer to reach an accurate formation of his enquiry.¹⁴ There is no reference to Melvil Dewey, whose great contributions to librarianship included the construction of a classification scheme (a "thesaurus") based precisely on the arrangement of terms into semantic hierarchies coded by the decimal notation. In Dewey's time, major advances in science were being made by the discovery and description of new entities, and the "classificatory sciences" were their records in which the arrangement took the form of a hierarchy, from genus to species. One of the greatest works of the nineteenth century was called *The origin of species*. Dewey's scheme made such a great impact because it reflected the way in which specialists

thought and wrote about their subjects, so his scheme made sense to them

Our own time has been characterised more by inter-disciplinary studies developing into new subjects like geophysics and biochemistry, as well as particle physics and molecular chemistry. There is a pressing need to combat over-specialisation, to develop what are sometimes called "scientific generalist" able to understand the principles and structure of several fields of knowledge without necessarily being expert in the details of any single field. Their task is to investigate patterns and interrelations rather than the structure of entities. As Laszlo says, "attention in the contemporary natural sciences has shifted from the descriptions of individual entities to the theoretical explanation of classes of entities forming ordered structures of events"

Now in order to proceed beyond the hierarchical relationship, we can draw on another well-authenticated mental function, the formation of categories, an idea at least as old as Aristotle and Confucius. It would be surprising, indeed, if the creator of a new mode of thinking in classification, like Ranganathan, were to fail to make use of the technique of forming categories. As we know, what mainly distinguishes him from previous innovators like Dewey and Bliss is that he generalised his set of categories and called them "fundamental", because he believed that the same pattern of interrelations existed in all, or at least most, fields of knowledge. Perhaps it should not surprise us that in Britain, with its long empiricist traditions, and still more in the USA, so heavily influenced by Pierce and James and their pragmatism, librarians have not found it easy to follow Ranganathan along this road.

Nonetheless, if we are to continue to look for harmony between the progress of knowledge as seen in the literature, and the schemes of classification that we use to arrange and index this literature, I believe that we must at all costs avoid the trap of imagining that the conceptual foundations of schemes of classification no longer matter. There is, of course, a strong belief that computerised indexing, with all the power of information technology, can ensure successful retrieval without bothering about semantic and syntactic relations. At least Wang et al. have realised the fallacy of this view.

In his discussion of classification, Hacking points out that although we live in a different world from that of the nineteenth century, and that new categories have been invented to make sense of the new world, it still remains the case that many of the old categories continue to be valid, because they "are natural kinds: people and grass, flesh and horseflesh. The world simply does have horses and grass in it, no matter what we think, and any conceptual scheme will acknowledge that". These are, so to speak, permanent entities, and any attempt to reformulate our categories will still have to take account of them.

A theory, like GST, aims to do just that; to explain as possible the events and phenomena in our environment, to embrace the new without discarding those elements of the old which still have empirical validity. The more general the theory, the more successful; and it is a long philosophical tradition which says that a successful theory is characterised by elegance and economy. There may be subjective disagreements over the elegance of PMEST, but no-one can deny its economy. Those who propound GST are searching for just such general conceptual categories which can accommodate new findings in specialist fields, in order to identify the principles of organisation and structure to be found in all of them.

As we analyse the literature of specific fields in constructing schemes of classification, we begin by assembling terms used by the specialists, and it soon becomes obvious that these terms do indeed fall into fairly clear conceptual groups, or categories, such that the terms in one group can not conceivably be placed in another. In Education, for example, one can clearly distinguish between terms like adolescent, chemistry, blackboard; each is a term from a conceptually different category. In Packaging, a tin can is the same sort of entity as a glass bottle, though their constituent materials are different, and both are different entities from soup and strawberries, and again from filling and heat processing. We have "container" terms, "content" terms, "operation" terms. The action of the three together produces a new class of entity, a prepared food pack. The relationship between the three categories determines the identity of the final product, and its part of the field of knowledge. If we were dealing with tinplate

and glass as materials, and blowing and forming as operations, we should have a different product and a different field, that of Container Manufacture. Ranganathan himself often gave similar examples.

I do not suggest that Ranganathan's categories are necessarily the final word as far as documentary classification goes; Vickery and CRG members have proposed others from time to time, and specialist schemes, including my own, have preferred to give their facets names more specific to the fields to which they apply. I do, however, suggest that the concept of Personality should not be dismissed as lightly as De Grolier and the others have done. Even though Ranganathan may not have given a satisfactory explanation, intuitively he had hit upon the same basic concept as GST, that of the "whole" and "wholeness". His statement that P is what remains when the other facets have been filled does not explain the relationship at all adequately. It is not "what is left over", but the inevitable and in fact the foreseen result of specific relationships between specific entities existing in specific fields; the relationships are internal between the constituent elements or parts, and external between themselves as wholes with characteristic integrity and their environment. In the light of contemporary philosophy, and particularly of GST, the Personality of the Personality facet makes a significant contribution to the theory and practice of documentary classification in relation to the literature which it has to arrange and index, and we shall deprive ourselves of a valuable concept if we ignore or discard it.

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2.4 Relevance of Ranganathan's Postulational Approach in the Identification of Key Concepts In the Newly Formed Subjects and Its Implications to Intellectual Organisation of Information

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The basic approach of Ranganathan in the intellectual organisation of information is analytico-synthetic. It aims to identify the atomising and recombining processes in the universe of knowledge made up of interaction between the universe of ideas and the universe of intellectuals. Thus interactive approach is ever effervescent, continuous, and unpredictably changing. Therefore, it is necessary to have a flexible system which has built in features to identify the orderly aspect as well as unpredictable one. In order to reduce the surprise value and the consequent throw-off in the order Ranganathan identified modes of formation of subjects in the emergence of new basic subjects. This paper examines the difficulties in recognising the roles of key concepts interacting in the newly formed basic subjects. A semantic analysis of the causal factors for recognition of PME in the compound subjects going with these subjects are discussed. The basic issue is not in the postulation of PMEST, but in the need to develop rules and regulations for recognising their incidence in newly formed subject. Developmental research done in this area at DRTC has given some derivative principles. Thus, the basic foundations of Ranganathan are found to be relevant for any systematic approach to organisation of knowledge. However, one has to develop the derivative principles from them to meet the changing contexts in the current knowledge utility milieu.

1 INTRODUCTION

The ever growing specialisation in the fields of human endeavour and the incessant growth of knowledge have led to increasing scope for research in library classification. Therefore, it is in the fitness of things that efforts towards developing a well-organised classification system is continuously carried on. The trends in research in library classification may

be succinctly stated as follows :

- (a) Knowledge about the structure and development in the universe of subjects;
- (b) Development of a dynamic theory of library classification to provide counter technique to meet the developments in the universe of subjects; and
- (c) Design, revision and continuously updating of schemes for library classification.

The trends in classification research in India demonstrates this.

11 *Analytico-Synthetic Approach*

The Indian approach to design, development and use of schemes for library classification has been spearheaded by the insight and incisiveness of the late Dr. Shiyali Ramamrita Ranganathan. His contributions have been consolidated in the three editions of the *Prolegomena* and the several editions of *Colon Classification* schedules. The essence of Ranganathan's approach to library classification typifies an analytico-synthetic process. The theory provides models, tools and techniques for the analysis of subjects into their elemental structures and for synthesising these ideas into assemblages in the manner appropriate to the intellectual needs of the users of information. To quote Ranganathan:

If the scheme for classification is sufficiently equipped with mnemonics of high potency to form foci, facet-formula with provision for optional facets to express all possible manifestations of the chosen fundamental categories as facets, and phase formulae with distinctive symbols for all possible relations between different subjects, every new specific subject will be borne with its own class number in its pocket, as it were. This will enable us to place it in an appropriate place amidst the elder subjects so that it will be *correctly understood by the Gestalt procedure by the context in the arrangement*.⁴⁵

Thus, the dynamic nature of the universe of subjects calls for a scientific approach to the evolution of the theory and

practice of library classification. The ideal set for this evolution is again brought home in the following statement of Ranganathan made in 1957 :

I think that analytico-synthetic classification has a great potentiality as a Transformer Language, and therefore, it becomes a fit subject for research and continuous improvement to effect economy in international effort, to promote international understanding and team work, and thus to help in the promotion of international peace. I further believe that the use of machinery for bibliographical search will demand an ever-increasingly minute break-down of subjects. This, in its turn, will stimulate research into the deeper foundations of truly individualising and expressive analytico-synthetic classification.⁴⁵

This farsight of Ranganathan has led into a series of continuous research in the field.

12 The Critical Factors Affecting the Design and Development of an Analytico-Synthetic Classification

The critical factors that affect the design and practice of an analytico-synthetic classification are two; the universe of subjects and the universe of users of information. In addition, the reasons or sensory capacity and the intellectual habit suggest a linear arrangement of subjects. This relationship is stated by Ranganathan as follows:

The intellect prefers to enumerate the classes of an array one at a time in succession. This creates a time-sequence, which is one-dimensional. Again the intellect prefers to apply the relevant characteristics of classification one at a time in succession. This also creates a time-sequence, which too is one-dimensional. A great contribution of Descartes to facilitate the study of space of two or more dimensions was his reduction of such a space of two or more spaces to one dimension. The phenomenal advance in the study of spaces of two or more dimensions made possible by the Cartesian coordinate system is well-known. This indicates our intellectual preference for arrangement in one dimension.⁴⁶

Thus, the manifold and multidirectional structure of universe of subjects and the tendencies of multidirectional approaches of diverse users of information have to be organised into a type of one-to-one relationship in a linear dimension. In order to do this, research in library classification in India tends in the following directions;¹⁴

1 Developments of methods of knowing the overall structure and developments in the universe of subjects.⁶⁹

2 Identifying the views of specialists in different fields on the overall growth of knowledge.^{3,6,7,56}

3 Recognition of the emergence of a new discipline or an idea and the various stages of development it has gone through.^{1,11,17,22,37,51,53,54}

4 Recognition of new modes of formation and development of subjects from time to time.^{1,11,22,38,35,54}

5 Assessing the rate of growth of subjects-macro as well as micro in a particular subject field, as a base for prediction of events likely to happen in the near future;^{2,27,40} and

6 Identifying the various factors that affect the thinking process of a normal intellect, that is, the ways in which the ideas get processed and structured in the human mind for communication purposes.^{24,29}

13 *Trends in the Theory of Library Classification*

The summarised statement of the current trends in the theory of library classification^{18,21} is as follows:

1 Evolution and development of dynamic theory of library classification based on an explicitly stated hierarchy of a normative principles.^{32,46}

2 Conducting a *priori* and pragmatic observations on various aspects of classification harmoniously blending the two approaches at suitable intervals of time.^{18,36}

3 Demarcation of the work involved in the design and development of schemes for classification and of classifying as belonging to three planes of work-idea plane, verbal plane and notational plane.⁴⁶

4. Tackling the problems at the seminal level without getting too much involved in the facts presented at the phenomenal level.^{5,26,39}

5 Developing a scale of priority for consideration and solu-

tion among different problems that may come up simultaneously.³⁰

6 Progressively making the work of the classificationists and that of the classifiers more productive and for this purpose :

61 Progressively minimise the number of situations wherein the incidence of flair and subjectivity of classificationist and classifier occur.^{15,23}

62 Progressively making the design and development work more and more amenable to scientific method.^{5,30,36} this may in turn.

63 Reduce the strain on the memory of the classificationist, classifier, and even the user with the aid of mnemonics of several kinds.⁴⁷

64 Developing canons, postulates and principles for developing a notational system particularly to meet the need for infinite hospitality and assignment of unique coextensive class numbers; and,^{21, 26,47}

7 Formulation and use of precise terminology for the discipline.¹⁹

There has been significant progress in many of these aspects; there are also gaps still to be bridged in some aspects. In fact, this appears to be a challenge for cyclic research which is never ending one. It truly depicts the famous Sanskrit dictum "*Siddham sadhiyaya kalpate*—what is achieved gives props for what is to be achieved." (A familiar quote from Ranganathan)

14 *Trends in the Development of Schemes for Classification*

The current trends in the development of schemes for library classification is on the side of continual development. The studies reported^{15,33} have shown that there are significant contributions in this area also. This bridges, in a sense, the gaps that are likely to exist between theory and practice of library classification. The trends in the research in the development of schemes for library classification may be summarised as follows :

1 Progressively conforming the structure of schedule and the class number to a specifically developed theory of library classification.^{15,16,16,20,33}

2 Continuously developing the versatility of the notational system of classification keeping in view the various restrictions imposed by the psychology of memory and the physiology of eye.^{4, 48}

3 Progressively develop a systematised method and rules for classifying the subjects embodied in documents.⁵⁰

4 Progressively proceed towards providing unique class number for every subject in the universe of subjects.

5 Develop a methodology and organisation to keep continuous feedback on the use of the classification and its problems; and

6 Decentralise production of schedules of classification at a much faster pace to meet the future growth.

15 *Incidence of Flair in the Recognition of Manifestation of Fundamental Categories*

The postulate of fundamental categories—Personality, Matter, Energy, Space and Time—was done by Ranganathan in 1944.⁴¹ The Colon Classification had already been designed. Two editions (1932;1939) has been published. The postulate was developed and a statement of it was made after an empirical analysis of about 1,008 sample examples. The analysis led to a generalisation and fundamentalisation. The next edition of the Colon Classification (Ed 3,1950) was published without incorporating the postulate of fundamental categories. The fourth, fifth and sixth editions (1952;1957;1960) incorporated the fundamental categories. But the recognition aids for fundamental categories—were not delineated.

The Classification Research Group members have looked at this problem critically.⁸ They did not agree to the postulate of fundamental categories although they accepted Ranganathan's facet analysis approach to the design of classification schemes. Norman Roberts in his critical analysis of the concept of personality said, "Unfortunately the distinction between the occasional glimpses of practical reality and the theoretical literature canvassing untenable views remains; on the evidence of current research activity supporting the colon classification scheme, the gap between theory and practice will continue to exist."⁵² The problem is not in the postulate of fundamental categories. But it is in the formulation of criteria for recognising the manifestation of fundamental categories. The mani-

festations of the fundamental categories in each specific subject is meshed is a special contextual texture. Ranganathan himself was aware of it. He stated "The crux of the matter in mechanisation of the postulated pattern is in the assignment of each facet of a subject to the appropriate fundamental category, and no general help is available in this important work in the idea plane. Some models alone can be given. The models are in the form of expressed schedules for the isolates in the respective facets. Applying these to actual subjects sufficiently often will develop a sense of feel about the fundamental categories, rounds and levels in any subject. There is nothing unusual or mystic in this; it is the way in which all our knowledge and skills are acquired and developed. There is hardly any royal road to it."⁴⁴ Thus it is found necessary to crystalise the feel and experience in the recognition of the manifestations of the fundamental categories.

2 ROLE OF CONTEXTS IN THE RECOGNITION OF CATEGORIES

Recognition of manifestations of the fundamental categories (FC) is beset with multiple problems. The recognition of manifestation can be done at three levels, namely, generic level, basic subjects level, and specific subjects level. Generic level of recognition of the manifestations of fundamental categories (FC) is primarily based on individual concepts. It is free from the contexts. The recognition of manifestations of (FC) for these concepts are based on their unique definitions. For example, the term 'snake' is deemed to be a manifestation of the (FC) Personality. Similarly, "building" is a manifestation of the (FC) Personality. "Iron" is a substance; it is a manifestation of the (FC) matter-Material. "Viscosity" is a Property. It is a manifestation of Matter Property. "Criticism" is an action. It is a manifestation of (FC) Energy. The recognition of manifestations of (FC) at the basic subjects level is context specified. Its comprehension or generality lies within the scope of the compound subjects going with that particular basic subject. This may be denoted as class intensive level. At the specific subject level, the recognition of manifestation of (FC) would be operative with only one compound subject. The relational aspects of different concepts incident in a compound subject would also effect the recognition of the (FC).

The generic level recognition of manifestation of (FC) can be correlated to near-seminal approach. The class-intensive level is correlated to optimum level approach and the specific subject level be correlated to phenomenal level, that is, closest to the reality of occurrence. The classificationist and the classifier are confronted with the organisation of the class intensive recognition of manifestations of the (FC). Such a recognition would provide an optimum approach to both generic as well as specific approach.

The recognition of the manifestations of the (FC) at the collective level of basic subject and at the level of specific subjects gives rise to different kinds of problems. These problems are to be identified and the measure of their incidence in the compound subjects is to be observed. The problems in relation to manifestations of the different (FC) are presented in this paper.

21 *Personality*

Personality is a core concept or core-entity of any subject statement. Its role is akin to the noun phrase of a sentence. In class intensive situation, this core concept could be anything. We find that different types of concepts can take the position of Personality. The recognition of Personality, therefore, became a problem. Probably it is this fact that made Ranganathan to suggest Method of Residues⁴⁸ as a procedure for the recognition of Personality Facet. However, while designing the depth classification schedules for different subjects, we have found the need to recognise the manifestation of the (FC) Personality. The manifestation of the (FC)—Matter, Energy, Space and Time—would then become easier. Thus the focal idea studied in the framework of a basic subject is deemed to be Personality. Thus the problems in the recognition of the (FC) Personality is not definitional, but contextual. The semantic and syntactic aspects in the formation of compound subjects and the generalisation of these structures to a nodal base—that is, a basic subject—sets the difficulties in the recognition of Personality. This paper examines these problems in the context of the interdisciplinary subjects and correlates these problems to the modes of formation of subjects.

22 Matter

The concept of the (FC) Matter was a dormant one in the first six editions of Colon Classification. Material constituent or passive content of a focal idea was considered to be Matter. But the recognition of a qualifier concept in 1963-64 led to the identification of material of make of an entity as one of the qualifiers. Therefore, the incidence of material as a manifestation of (FC) Matter appeared very rarely. When property ideas were deemed to be manifestation of (FC) Matter, the chance for incidence of the same increased in compound subjects. But the problem of distinction between property and action isolates came into prominence. Thus, the problem of recognition of the matter isolates and energy isolates were dependent on isolating passive and active nature of the action connoting terms. For example, the concept "design" in the compound subject "practical design considerations for CDC solar collectors" can be deemed as matter property, if it is a passive state and can be deemed as energy category, if it is an active concept. Besides, there could be problems associated with a qualifier and the property isolate. For example, large motor car and largeness of a motor car may not appear clearly in the formation of expressive title of the subject. One is often mistaken for another. The problem may be attributed to heterogeneous nature of formation of subjects.

23 Energy

The (FC) Energy is an important one. Normally it is associated with transitive verb or action concepts. In CC (ed 4, 1952 to ed 6, 1966), it was associated with problem facet. This led to basketing in of non-homogeneous set of ideas into the manifestations of (FC) Energy. The recognition of property as a manifestation of (FC) Matter relieved this to some extent. But the manifestations of (FC) Energy gives rise to conflict with (FC) Matter in relation to functional and non-functional activities. For example, "metabolism" is a functional activity of living organism. It may give rise to doubt about its manifestation as to whether it is Energy or Matter (property). The qualifiers to energy such as agent of action, method of action, instruments of action, posed excessive problems in the recognition of manifestation of (FC) Energy.

3 GROUPING OF PROBLEMS

The recognition of the manifestations of (FC) is impeded by hindrances. This paper aims to identify some of these hindrances. The hindrances are caused by several factors. Four such types have been identified. They are : Qualification, Multi-connotation, Heterogeneity and a combination of age, utility, literary warrant and professional status. A term may connote more than one role of an idea. Then the problem is how to recognise the manifestations of the (FC) of these multi-connnotations. For example, the concept "design" could be studied in two states- the static as well as dynamic. The static state would mean the structure aspects or description of structure. The dynamic state would connote the process of creating the structures, that is, "designing" itself. Such connnotations would lead to conflict in the recognition of (FC). Heterogeneity refers to the non-coherent formation of the compound subject. This gives rise to problems in the recognition of the (FC). The situational structure of the subject has to be analysed. This is illustrated by the following compound subjects going with the basic subject "sociobiology". Consider the subject, "An age irrelevant concept of development". The bond strength between the concept of "development" and "free-from age" is not a coherent one. Similarly, consider the subject "Degree of human isolation measured by isonymy and marital distances in two communities in an Italian Alipine valley". Here again, the heterogeneity is visible in the bond strength between "Human genetic isolation" and "isonomy" and "marital distances". This is purely due to heterogeneity in the formation of compound subjects. In addition, the developmental stage indicates the problems due to growth of the subject field. The age of the field, the utilitarian aspects, the professional commitments and the literary warrant taken together affects the recognition of manifestations of (FC). This is denoted by the abbreviation AULP. This indicates that the stage of development of the basic subject influences the recognition of the manifestations of the (FC). The following subject propositions would illustrate the problem: "Social inhibition of maturation in natural population of varieties." Here the influence of concept on "social inhibition" and "maturation" is still in an evolving process. This is a type of loose assemb-

lage stage of the formation of subjects. This is the first stage of formation of an inter-disciplinary basic subject. Another example would be "Ecologically oriented family intervention". The ecology is correlated with "Family intervention" in maintaining a homeostasis. This indicates a nascent formation of the interdisciplinary basic subject.

Thereafter we identify one more problem; the problem of qualifiers. They qualify a principal idea and this results towards more specific idea. Such an isolate is a compound subject. The problem caused here is the problem of identification of the principal isolate. Once this is done, the qualifiers could be easily fixed. In interdisciplinary subjects, this problem is pronounced. For example, in "international relations", the specific subject "Peking : Hegemonism in action in South Asia", the Personality focus claimants are likely to be three—"South Asia", "China" and "Hegemonism". The recognition of one principal idea could relegate the others to the status of qualifiers.

4 RELATION BETWEEN THE CAUSAL FACTORS AND MODES OF FORMATION OF SUBJECTS

41 *Formation of New Basic Subjects*

The ever-generating process of new subjects has been illustrated by the variety of modes of formation and the development of subjects. The late B.I. Palmer said in his book *Itself an education* about this emergence in the following manner : "We can, perhaps, illustrate the method of emergence of classes by likening the field of knowledge to a large sheet stretched tightly in the horizontal plane. On this sheet are scattered iron filings; under it are placed a number of electro-magnets representing human energies, when the power is switched on, the iron-filings assume patterns related to the lines of force of the magnets. Those nearest the magnet show no hesitation in polarising themselves, and may be taken to the main class (subject). Those at the extreme ranges of attraction of two or more magnets betray some hesitation before they associate themselves with the lines of force of any one magnet, and it takes little to upset them and reassociate them with another." These are like the subjects on the peripheries of main classes (subjects); multiphased subjects which have affiliates with more

5 DATA COLLECTION AND PRESENTATION

The specific subjects chosen from a large assortments of subjects were examined. Three hundred and sixty examples were chosen for facet analysis.¹³ The following table presents a distribution of the number of samples chosen for each group of subjects :

TABLE 5.1

<i>SN.</i>	<i>Interdisciplinary subjects</i>	<i>No. of specific subjects</i>
1	General Systems Theory	103
2	Sociobiology	88
3	Solar Energy Studies	94
4	International Affairs	75
Total		360

51 Modes of Formation Correlated with Causal Factors

The Table 5.2 presents a distribution of the causal factors in the recognition of manifestations of the (FC) of 360 interdisciplinary specific subjects. The distribution of these is

TABLE 5.2

<i>Modes of Formation Causal Factors</i>	<i>Disti- llation</i>	<i>Fusion</i>	<i>Entity cluster</i>	<i>Problem- cluster</i>	<i>Total</i>
Qualifiers	74	20	34	43	171
Multiconnotation	17	21	28	3	69
Heterogeneity	11	24	22	17	74
AULP	1	23	10	12	46
Total	103	88	94	75	360

correlated to the modes of formation. The column-wise distribution is made by type of modes of formation (see chapter 2). The row-wise distribution is by type of factors causing problems in the recognition of the (FC). A cell in this double-array indicates the incidence of the causal factors in a particular mode of formation.

52 Chi-Square Test

A non-parametric test using a Chi-square statistics carried out (as usually done for contingency table) for the data presented

in the above table. The critical value χ^2 for significance level 0.05 is 16.919 (for 9 degrees of freedom). The computed value of the χ^2 is 76.32. The null hypothesis is rejected. This suggests that there is a relationship between the causal factors in the recognition of the manifestation of the fundamental categories and the modes of formation of subjects.

53 Observations

The causal factors are distributed in different modes differently. In case of distillation mode, there is a deep descent of incidence from qualification to AULP. The qualification is the highest 74; the multiconnotation type come down to 17; Heterogeneity to 11, and AULP 1. Whereas the causal factors are uniformly distributed in the mode of fusion. In case of entity cluster, the distribution gradually declines from qualification to AULP. The problem-cluster also has a gradual descent but multiconnotation has the least incidence. In the row-wise observation, the qualifiers have the highest incidence, approximately 47.50%. Multiconnotation is 19.16%, Heterogeneity 20.55% and AULP is the least, that is, 12.77%.

The distillation mode has the highest incidence of the qualification cause. This may be attributed to the fact that theoretical basic subjects formed out of distillation grow from specific situations to formal ones; from abstract to concrete concepts. In the process, arises a highly diverse types of qualifiers. This in itself creates a problem in the recognition of the manifestation of (FC). The fusion mode has the lowest incidence of qualifiers as problems. The problem-cluster has the second highest incidence of qualifiers and the entity-cluster mode, the third highest. In respect of multi-connotation, the entity-cluster mode has the highest incidence (About 40% of the total incidences studied). It is lowest in problem-cluster mode (It is less than 5%). The fusion mode has second highest incidence that is about 30% and the distillation-mode has about 25% incidence of multiconnotation problems. The causal factor—Heterogeneity—is distributed more evenly than the other factors. It is highest (33%) in the fusion mode; 30% in entity-cluster, 22% in problem-cluster, 15% in distillation mode. The AULP is the highest in fusion, that is about 50%. This is due to phase relation process which still leaves traces in the recognition of manifestations of (FC). It is the

lowest in the distillation mode; it is only 2%. It may be attributed to the fact that the phase relation process has no trace at all in relation to its impact on the recognition of manifestation of the (FC) in the distillation mode. The AULP has about 25% of its total incidence at entity-cluster and 30% incidence in problem-cluster. Thus, it may be seen that the distillation mode is fairly well-formed subject. The other three modes have yet to develop to the full bloom.

54 Analysis

Generalising the incidence of the problems in the four interdisciplinary subjects, we may formulate the following extrapolations :

1 The theoretical subjects formed out of distillation mode has qualifiers as the highest cause for problems in the recognition of manifestation. The other factors are relatively insignificant.

2 The life-oriented subjects formed out of fusion have a uniform distribution of all the causes of problems in the recognition of the manifestations of the fundamental categories. This is a typical mode to illustrate all the problems in a proportion.

3 In the applied natural science subjects formed out of entity-cluster mode, there seems to be a fair amount of incidence of all the four problems. But there is a gradual decline of the number of incidences as we move from qualifiers, multiconnotation, heterogeneity and AULP. This indicates an affinity to life-oriented subjects, but with a difference of gradual descent.

4 In the applied social sciences formed out of problem-cluster mode, there seems to be a high proportion of qualifiers causing problems. The other three causes are relatively less. Multiconnotation seems to be almost nil.

5 There seems to be an affinity in the pattern of incidence of causes in the recognition of the manifestations of the fundamental categories in the fusion mode, entity-cluster and problem-cluster. The distillation mode has a different pattern. This can be attributed to the first three modes being oriented to applied studies, whereas distillation mode is oriented to theoretical studies. The clustered modes have greater affinity pattern from that of fusion mode.

6 The causal factors indicate a general pattern of distribution. Qualifiers are highest in all the modes except in fusion. Multi-

connotation is the next highest in all the modes except problem-cluster mode. Heterogeneity comes third in order, but for fusion, where it is highest and the problem-cluster where it is second highest. AULP comes fourth in order but almost non-existent in distillation mode. The distribution of causal factors indicates theoretical subjects are fairly free from the three causal factors—multiconnotation, heterogeneity and AULP. The applied subjects have fair sprinkling of all the four causes. The problem-cluster has a negligible incidence of multiconnotation. This seems to contradict the general notion that in applied social sciences, synonyms are more. This may be explained in another way. The context specificity of specific subjects in applied social sciences does not give much scope for multiple connotation for a term embedded in its formation.

7 The linking of causes of problems in the recognition of the manifestations of each of the (FC's) Personality, Matter and Energy to the modes of formation of subjects would give more closer patterns.

6 INCIDENCE OF CAUSAL FACTORS IN THE RECOGNITION OF MANIFESTATION OF PERSONALITY

61 *The Data*

The incidence of the four variety of factors causing problems in the recognition of the manifestation of the (FC) Personality is presented in the succeeding table (table 2). The problems are correlated with the modes of formation of subjects.

612 *Table 6.1*

Table 6.1 presents data in double array. The row presents data according to causal factors of the problems in recognition of Personality. The column presents distribution according to modes of formation of subjects. The double array presents the number of incidence of causal factors in different modes of formation in relation to the recognition of manifestations of the (FC) Personality.

TABLE 6.1

**Incidence of Causal Factors in the Recognition of
Manifestation of (FC) Personality**

<i>Modes of formation Causal Factors</i>	<i>Distillation</i>	<i>Fusion</i>	<i>Entity-cluster</i>	<i>Problem cluster</i>	<i>Total</i>	<i>Percentage</i>
Qualifiers	79	29	32	54	194	61.51
Multiconnotation	9	63	9	1	82	26.00
Heterogeneity	10	6	10	6	32	10.00
AULP	1	7	1	0	9	2.50
	99	105	52	61	317	

62 Chi Square Test

The non-parametric test using chi-square statistics was carried out (as usually done for the contingency table) for the data presented in Table 6.1. The critical value of χ^2 for significance level 0.05 is 16.919 (for 9 degrees of freedom). The computed value of χ^2 116.293. This suggests that the null hypothesis should be rejected. This means that there is a relationship between the causal factors of problems in the recognition of the manifestations of the (FC) Personality and the modes of formation of subjects.

63 Observation

The problems in the recognition of manifestations of the (FC) Personality are incident 317 times in the sample of 360 specific subjects. The problems due to qualifiers in highest in number about 61.5% of the total. Multiconnotation has also fairly a good number of incidences. It is about 26% of the total. The other two causes, namely heterogeneity and AULP taken together has an incidence of only about 12% of the total. Of this heterogeneity is about 10%. The AULP's shares about 2.66%. Thus, the major contributors to the causes of the problems in the recognition of the manifestations of (FC) Personality are qualifiers and multiconnotations. In distillation mode, most of the incidence are qualifiers. Out of 99 incidences of problems, 79 are due to qualifiers, nine due to multiconnotation; ten due to heterogeneity and one to AULP. In the fusion mode, the multiconnotation has the highest incidence 60% qualifiers about 28 per cent, the other two causes being about

6% each. Here also we find that the major portion of the incidences is attributable to multiconnotation and qualifiers. In relation to entity-cluster, we find that 60% is due to qualifiers; of the rest of the causes heterogeneity is 20%, and multiconnotation is about 38%. The AULP has 2% incidence. The problem-cluster has incidence of 90% of the problems due to qualifiers. Out of the rest of the 10%, 9% is due to heterogeneity, and only 1% is due to multiconnotation and AULP is zero.

64 Analysis

The generalisation of the incidence of causes of problems in recognition of manifestations of (FC) Personality may be formulated into following extrapolations :

1 The theoretical subject has the problem of qualifiers in relation to the recognition of the manifestations of (FC) Personality. It is almost exclusive as well other causes are not incident in a significant measure. Thus there is a need for typology of qualifiers.

2 The life-oriented subject formed out of fusion has the highest incidence of multiconnotation. This means that the manifestation of (FC) Personality has to be solved in the context of specific subject.

3 The applied natural sciences formed out of entity-cluster has the highest incidence of quatifiers and thus there is a need for typology of qualifiers.

4 The applied social sciences reflect the same trend. That is, the qualifiers cause a majority of the problems in the recognition of the manifestations of (FC) Personality. There is need for developing a typology of qualifiers.

5 The patterns exhibited indicate that except in the case of fusion, all the other modes of formation have qualifiers as the principal problem of recognition of manifestation of Personality. The fusion mode has multiconnotation as the major cause of the recognition of problems.

7 INCIDENCE OF CAUSAL FACTORS

In the recognition of manifestations of (FC) Matter, the incidence of causal problems are analysed.

71 Data

The incidence of causes in the recognition of the manifestations of (FC) Matter is presented in the following table.

TABLE 7.1

**Incidence of Causes in the Recognition of Manifestation
of (FC) Matter**

<i>Modes of formation/ Causal factors</i>	<i>Disti- llation</i>	<i>Fusion</i>	<i>Entity Cluster</i>	<i>Problem Cluster</i>	<i>Total</i>	<i>Percentage</i>
Qualifiers	17	8	19	3	47	42.0
Multiconno- tation	6	9	20	5	40	37.6
Heterogeneity	4	1	7	3	15	13.6
AULP	0	5	0	3	8	7.3
	27	23	46	14	110	

The Table 7.1 presents the data in double array. The columns present the incidence of problems distributed by modes of formation. The rows present distribution of incidence by causes. The double array indicates the number of incidences of a cause in a mode of formation of subjects.

72 The Chi Square Test

The non-parametric test using the Chi Square statistics was carried out (as is usually done for contingency table) for the data presented in Table 7.1. The critical value of for significance level 0.05 is 16.919 (for 9 degrees of freedom). The Computed value of χ^2 is 24.61. This suggests that null hypothesis should be rejected This means that there is a relationship between the causal factors of the problems of recognition of manifestations of (FC) Matter and the modes of formation of subjects.

73 Observation

There is relatively a smaller number of incidences of the problems in recognition. The major causes are due to qualifiers and multiconnotation of terms. They share 42.7% and 37.6% respectively of the total incidence. The heterogeneity has an incidence of 13.6% and AULP has 7.3% and of the total. In relation to modes of formation of subjects, distillation has qualifiers as a major cause, the multiconnotation following it had heterogeneity taking the third place. The AULP has none. The fusion mode has an almost equitable amount of

incidence of qualifiers and multiconnotation. It has more number of incidence of problems due to AULP than due to heterogeneity. Similar is the pattern for entity-cluster mode. The problem-cluster has an uniform distribution, heterogeneity having a slightly higher incidence.

74 Analysis

The generalisation of the trends in the incidence of causes of recognition of manifestations of (FC) Matter may be formulated as follows :

1 The theoretical subjects formed out of distillation have a large incidence of problems in recognition of the manifestations of (FC) Matter. A typology of qualifiers may have to be evolved.

2 The life-oriented subjects formed out of fusion mode have an equitable incidence of problems due to qualifiers and multiconnotation in the recognition of manifestations of (FC) matter.

3 The applied natural sciences arising out of entity cluster, have an equitable distribution of problems due to qualifiers and multiconnotation in the recognition of manifestations (FC) Matter.

4 The applied social sciences arising out of problem-cluster have a uniform distribution of problems due to all the four different factors in the recognition of manifestations of (FC) Matter.

8 INCIDENCE OF CAUSES IN THE PROBLEMS OF RECOGNITION OF MANIFESTATION OF (FC) ENERGY

81 Data

The following table (on p. 174) presents data on the number of incidence of causes of problems in the recognition of manifestations of (FC) Energy. The sample specific subject studies is 360.

The Table 8.1 presents column-wise distribution of incidence of problems according to the modes of formation. Row-wise,

TABLE 8.1
Incidences of Causes in Recognition of Manifestations
of (FC) Energy

<i>Mode of formation/ Causal Factors</i>	<i>Disti- llation</i>	<i>Fusion</i>	<i>Entity cluster</i>	<i>Problem cluster</i>	<i>Total</i>	<i>% of incidence</i>
Qualifiers	45	24	33	22	124	73.8
Multiconno- tation	0	5	7	4	16	9.5
Heterogeneity	4	4	9	4	21	12.5
AULP	0	5	2	0	7	4.2
Total	49	38	51	30	168	

it presents the distribution of incidence of causal factors. The double array presents data in combination of both.

82 *Chi Square Test*

The non-parametric test using a chi square statistics carried out (as is usually done for 2×2 contingency table) for the data presented in Table 8.1. The critical value χ^2 for the significant level of 0.05 is 16.919 (for 9 degrees of freedom). The computed value of the χ^2 is 23.460. This suggests that there is a relationship between the causal factor of problems in the recognition of manifestations of (FC) Energy and the different modes of formation of interdisciplinary subjects chosen as sample for study in this thesis.

83 *Observation*

The incidence of problems in the recognition of manifestations of (FC) Energy is fairly representative in the sample of 360 specific subject chosen for study. The major cause for the problem is the qualifiers. They account for nearly 74% of total incidence of problems, Heterogeneity causes 12.5% the incidence of problems, while Multiconnotation accounts for 9.5% and 4.2% by AULP.

The Distillation mode has qualifiers, as the largest cause, that is, 90%. Heterogeneity causes the other 10%. Fusion has an incidence of 60% problems due to qualifiers. 15% of the problems are accounted by Multiconnotation and another

15% by AULP. About 10% is due to heterogeneity. In the entity-cluster, 66% of the problems are incident in it due to qualifiers; 18% due to heterogeneity; 14% due to multiconnotation and 4% due to AULP. The problem-cluster has no incidence of problems due to qualifiers, 12.5% due to multiconnotation and another 12.5% due to heterogeneity.

84 Analysis

The generalisation of trends in the incidence of causes in the recognition of the manifestations of (FC) Energy may be made as follows :

1 All the interdisciplinary subjects chosen in the sample show that there is a large number of incidence of problems due to qualifiers in the recognition of the manifestations of the (FC) Energy. The Energy has different varieties of qualifiers, namely, Agent of Action, Method/Technique of Action, Tools for Action, etc. as qualifiers.

2. The theoretical subjects formed out of distillation have no incidence of problems due to heterogeneity or AULP. This indicates that the subject is well formed in relation to the manifestations of (FC) Energy.

3 The applied social science subjects formed out of problem-cluster do not have any incidence of problems due to AULP. This indicates the manifestations of (FC) Energy are generally well-formed. This may be attributed to the occurrence of the common action isolates.

9 THE GENERAL PATTERN

The pattern of incidence of causal factors of problems in the recognition of manifestations of the (FC) is related to the modes of formation of interdisciplinary subjects. The subjects formed out of distillation mode show a difference from those formed out of the other modes. The distillation mode result in developing a theoretical basic subject. The incidence of causal factors/qualifiers is high in distillation mode. In all the tables, it may be observed that the incidence of other causal factors in the problems of recognition is relatively few in respect of distillation mode. The subjects formed out of fusion and cluster modes show a fair amount of incidence of causal factors; multiconnotation heterogeneity and AULP. The applied subjects

formed out of these fusion and cluster modes show that the qualifiers cause considerable problems in the recognition of manifestations of the fundamental categories. In the subjects formed out of fusion mode, we find that there is relatively uniform distribution of causal factors. In the subjects formed out of fusion mode, we find that there is relatively uniform distribution of causal factors. In the subjects formed out of entity cluster, the incidence of causal factors shows a gradual descent from qualifiers, multiconnotations heterogeneity and AULD. The subjects formed out of problems-cluster exhibits an absence of multiconnotation and AULP. The applied subjects, however, indicate their developing stage markedly than the theoretical ones.

We have studied in this paper the results of the experiment designed for the analysis of incidence of factors of problems in the recognition of manifestation of the (FC). The data presented in table 1 in Sec 5. 1. 1 is not the cumulative total of the incidence of causal factors of the other three tables given in this chapter. It is a measure of incidence of one type of problem the dominant one—in the subject. It does not count more than once the recurrence of the same type of problem in one and the same subject proposition. We found through non-parametric test (chisquare test) that there is a significant correlation between these causal factors and the modes of formation of subjects. It has also been found that the causal factors maintain a general pattern of incidence of problems in all three (FC) namely, Personality, Matter and Energy. The marked difference is exhibited between theoretical and applied subjects in relation of incidence of causal factors, multiconnotation heterogeneity, and AULP. The applied subjects formed out of the modes of fusion, entity-cluster and problem-cluster have a larger share of incidence of these factors than the theoretical subjects formed out of distillation. The analysis of the specific instances of incidence of the causal factors has given scope for generalisation of patterns.

10 CONCLUSION

Thus, we find that while Ranganathan's theory of library classification has seminal and resilient features embedded in it, the actual recognition of manifestation of the fundamental

categories (FC) calls for additional cues, guides and principles. This is a kind of developmental research needed from time to time. Thus, on the basis of the analysis in this paper, I feel that the basic features of Ranganathan's theory of classification are relevant, sustainable to any development in the universe of subjects and universe of information users. But these would need adaptive guides and other recognition aids for application at a practical level. Ranganathan's philosophy is seminal and easily adaptable to changing conditions. Here I quote Prof. D.J. Foskett on Ranganathan's theory.

"In order to find a sound theoretical basis for the choice and sequence of facets in a scheme, Ranganathan advanced the solution of relating facets to a set of fundamental abstract notions which he called time, space, energy, matter, and personality. Every facet of a basic class is a concrete manifestation of one of these. The time facet is for chronological division, the space for geographical division; these are clear and are to be found virtually in every classification scheme. Energy and Matter, illustrated in technology by raw material and process, are not so easily identifiable in some other subjects in the social sciences and humanities. For example, Personality if interpreted as the end product in a technology, or the educand in education, can be seen to be reorganisable entity, with an identify that is unique and clearly separable from other entities, but it has certainly caused more difficulty and controversy than any of Ranganathan's other fundamental categories. Nevertheless, for him it is the most important of the categories, since it is the personality facet that contains the terms that give the class itself its own identify in the field of knowledge."⁹ In a later paper DJ Foskett highlights the role of Personality in the context of the general systems theory. He says: "In a general classification scheme for documentation, any system can be named a Basic class, in DRTC terms, because all systems can be analysed by facet analysis. The system itself, considered as a whole, becomes the Personality. Its constituent parts and the relations between them become Matter and Energy, which I call Energy A. The relations of the system with its environment are also processes which I call Energy B. The other systems in the environment, which react with our original system are Agents or, in Ranganathan's own terms, Second Round Personality. Of course, we do not

have to accept Ranganathan's own terms: I do so here in order to illustrate how appropriately system theory fits the scheme of the greatest contributor to documentary classification since Dewey and Bliss"¹⁰. Like systems theory, Ranganathan provides a basic philosophy to library classification and in general to the intellectual organisation of information. The depth and the coherence in Ranganathan's philosophy have greater relevance today, in inputting information into data bases and in design of integrated information systems.

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2.5 Users Preference of Sequence of Component Ideas in Subject Representation : PMEST Model

HEMALATA IYER

Studies the user preference of sequence of component ideas in a subject giving rise to a structured pattern which assists communication, learning and remembering. Conducts an experiment to test the hypothesis that there is a consistent way in which concepts going with a subject are sequenced by majority of users. The experiment involves choice of compound subjects, choice of respondents and administering of the compound subjects to the respondents. Analyses 10 compound subjects according to five fundamental categories (PMEST) of Dr. S.R. Ranganathan. Analysis show that the sequencing of concepts in a given compound subject by specialists—the coverage is upon a common sequence which simulates the PMEST pattern.

1 INTRODUCTION

Subject representation is the principle basis on which systems retrieve information and subject indexing systems are primarily concerned with analysing, identifying and representing relations between component ideas of a subject of documents and/or user queries. Such a sequence of component ideas in a subject giving rise to a structured pattern assists communication, learning and remembering. Therefore if the structured pattern used in the representation parallels the sequence in which the human mind tends to arrange the component ideas, the system is likely to be more helpful and effective in communication, learning, remembering and in retrieving information. This paper reports the study undertaken to test the postulate of existence of such a common pattern or preferred sequence of component ideas for subject representation among majority of users.

2 HYPOTHESIS

There is a consistent way in which concepts going with a subject are sequenced by majority of users.

3 EXPERIMENT

An experiment was designed to test the hypothesis. The experiment involved the following aspects :

- 1 Choice of compound subjects;
- 2 Choice of respondents;
- 3 Administering the compound subjects to the respondents;

31 Choice of Compound Subject

The choice of compound subjects for the study is guided by the fact that it should be in the field of Psychology and have ideas which is a manifestation of each one of five fundamental categories PMFST.

With these two criteria the following 10 compound subjects were chosen for this study.

1 Development of children's mathematical symbolism in India during 1976.

2 Effect of family setting upon cognitive development of the children in Europe in 1980.

3 A comparison of attitudes towards alcohol abuse of high school athletes and non-athletes in India in 1980

4 Study of the visual capabilities of kitten undertaken in India in 1979.

5 Influence of drugs on drug attitude of school students in India in 1980

6 A study of attitudes of elementary teachers towards exceptional children in India during 1980.

7 Effect of contingency management on academic achievement of mentally retarded Arab students in Saudi Arabia in 1978.

8 Evaluation of Mexican American children intelligence in America in 1965.

9 Treatment of mentally ill patients in Medieval England.

10 An analysis of job satisfaction amongst engineering teachers in India during 1970.

32 Choice of Respondents

The sample population chosen for the study was based on the criteria that they should be specialists in the field of Psychology/Psychiatry and working in the field. Hence the sample included Psychologists, Doctors, Neuro-surgeons, and Psychiatrists working in the National Institute of Mental

Health and Neuro Sciences (NIMHANS). A sample of 32 was taken.

33 *Administering the Concepts*

In each of the titles key concepts were underlined and the respondents were asked to sequence the underlined concepts in each title, in the most logical way, that would communicate the meaning of the title. The list of titles is given in Appendix 'A'.

4 ANALYSIS

The analysis of the data involved the following aspects :

- 1 Analysis of the titles;
- 2 Analysis of individual respondent's returns;
- 3 Analysis of the sample returns of the 32 respondents.

41 *Analysis of Titles*

The underlined concepts in each of the 10 titles were analysed into their respective fundamental categories. Some of the facets had speciators, but the facet-speciator together was taken as a single unit, representing the facet concerned.

- 1 Children (P); Mathematical Symbolism (M); Development (E). India (S) '1970 (T)
- 2 Children (P); Cognitive development (M); Effect of family meeting (E). Europe (S) '1980 (T)
- 3 High School athletes (P); Attitudes—alcohol abuse (M); Comparison—non-athletes (E). India (S) '1980 (T)
- 4 Kittens (P); Visual capabilities (M); Study (E). India (S) '1979 (T)
- 5 School students (P); Drug attitudes (M); Influence—drug knowledge (E). India (S) '1979 (T)
- 6 Elementary teachers (P); Attitudes—exceptional children (M) : Study (E). India (S) '1980 (T)
- 7 Mentally retarded Arab students (P); Academic achievement (M) : Effect—contingency management. Saudi Arabia (S) '1978 (T)
- 8 Mexican American Children (P); Intelligence (M) : Assessment (E). Canada (S) '1979 (T)
- 9 Patients (P); Mentally ill (M) : Treatment (E). England (S) 'Medieval ages (T)
- 10 Engineering teacher (P); Job satisfaction (M) : Analysis (E). India (S) '1970 (T)

4.2 Analysis of Individual Respondents Returns

Every respondent's returns were analysed :

1 In terms of assigning ranks to the terms as sequenced by the respondent;

2 In terms of measuring the concordance, amongst the rankings of the respondents.

4.2.1 Assigning Ranks to the Terms

Each of the underlined terms in the title that were sequenced by the respondents, were assigned ranks in the ascending order, on the basis of the position of the terms.

Illustration : Title 1 : The effect of family setting on the cognitive development of children in Europe in 1980. The sequencing of the terms as done by the respondent and the ranks assigned is given below :

Effect family setting (E) (Rank 1) children (P) (Rank 2) Cognitive development (M) (Rank 3) Europe (S) (Rank 4) 1980 (T) (Rank 5)

In the above instance, (P) is assigned rank 2, (M) rank 3, (E) rank 1, (S) rank 4, and (T) rank 5. All the titles were thus analysed and ranked, and the total of the ranks for each fundamental category was calculated

		(P)	(M)	(E)	(S)	(T)
Title	1	3	2	1	4	5
Title	2	1	2	3	4	5
Title	3	1	2	3	4	5
Title	4	3	1	2	4	5
Title	5	2	1	3	4	5
Title	6	1	2	3	4	5
Title	7	1	2	3	4	5
Title	8	1	2	3	4	5
Title	9	1	2	3	4	5
Title	10	1	2	3	4	5
		15	18	27	40	50

The sequence of terms is done based on the least value of the ranks. Thus the sequence in this case is 15, 18, 27, 40, 50, i.e., PMEST.

422 Measurement of Concordance amongst Rankings

In order to identify if there is concordance amongst the rankings of the 10 terms of the titles, the measure of concordance ' W ' was computed. Kendall (Maurice G). *Rank correlation methods*. Ed 4. 1970. p. 95)

$$W = \frac{12S}{m^2(n^2 - n)}$$

' W ' being the coefficient of concordance. ' S ' being the sum of the actual deviations of the total sum of ranks of each fundamental category, from the mean of the sums of ranks.

M = number of titles, i.e. 10

n = number of items in each title, i.e. 5

W measures the commonality of judgements of m responses. If they all agree $W = 1$. If they differ very much, among themselves the sums of the ranks will be more or less equal and consequently the sum of squares ' S ' becomes small compared with the maximum possible value, so that W is small. As W increases from 0 to 1 the deviations become "more different" and there is greater measure of agreement in the ranking.

Here $W = .878$

43 Analysis of Sample Returns of the 32 Respondents

The 32 respondents returns were analysed, ranked and the measure of concordance computed in the same way as given in section 421 and 422. To estimate the true ranking of concepts by all the respondents, a measures of concordance for the rankings by all the 32 respondents was computed.

TABLE 4.1. Coefficient of Concordance for 32 Respondents

Respondent (R)	Sequence of component ideas	Coefficient of concordance W
R 1	(P)(M)(E)(S)(T)	.86
R 2	(M)(E)(P)(T)(S)	.826
R 3	(M)(P)(E)(S)(T)	.862
R 4	(E)(M)(P)(S)(T)	.854
R 5	(E)(M)(P)(T)(S)	.474

R 6	(M)(P)(E)(S)(T)	.974
R 7	(P)(M)(E)(S)(T)	.974
R 8	(P)(M)(E)(S)(T)	.95
R 9	(M)(E)(P)(S)(T)	.79
R 10	(M)(P)(E)(S)(T)	.862
R 11	(M)(E)(P)(S)(T)	.85
R 12	(P)(M)(E)(S)(T)	.928
R 13	(P)(M)(E)(S)(T)	.796
R 14	(E)(P)(M)(S)(T)	.938
R 15	(M)(P)(E)(S)(T)	.569
R 16	(P)(M)(E)(S)(T)	.928
R 17	(P)(M)(E)(S)(T)	.938
R 18	(P)(M)(E)(S)(T)	.824
R 19	(P)(M)(E)(S)(T)	.815
R 20	(P)(M)(E)(S)(T)	.818
R 21	(P)(M)(E)(S)(T)	.993
R 22	(P)(M)(E)(S)(T)	.825
R 23	(P)(M)(E)(S)(T)	.928
R 24	(P)(M)(E)(S)(T)	.928
R 25	(P)(M)(E)(S)(T)	.824
R 26	(E)(P)(M)(S)(T)	.79
R 27	(P)(M)(E)(S)(T)	.974
R 28	(P)(M)(E)(S)(T)	.938
R 29	(P)(M)(E)(S)(T)	.824
R 30	(M)(P)(E)(S)(T)	.795
R 31	(P)(M)(E)(S)(T)	.826
R 32	(M)(P)(E)(S)(T)	.669

It may be observed that in most of the cases the coefficient of concordance is above .7. In two cases it is .569 and .474. Hence there seems to be a very high degree of consistency among the rankings of 10 titles done by every respondent.

In order to test the null hypothesis H_0 , a significance test was done.

H_0 = There is no significant consistency among the rankings of concepts by an individual.

H_1 = There is a high degree of consistency among the rankings of concepts by individual.

The Fisher's 'z' distribution was used for this purpose. [Kendall (Maurice G). Rank correlation methods. Ed 4. 1970, p. 98]

$$z = \frac{1}{2} \log \frac{(M-1)W}{1-W}$$

$$v = n - 1 - \frac{2}{M}$$

$$v_2 = (m - 1) / v / 1$$

The value of 'z' was calculate for all the 32 values of 'W'
The calculated value of 'z' were :

$$W = .474, 'z' = 1.046$$

$$W = .974, 'z' = 2.91$$

All other values of 'W' ranges between 1.046 and 2.91

$$v_1 = 3.8$$

$$v_2 = 34.2$$

Since the table values are given for 30 and 60 degrees of freedom, the value of 34.2 was calculated by interpolation. Similarly the value of 3.8 was calculated by interpolating between 3 and 4. The table value in the Fisher's table for v_1 and v_2 (3 8, 34.2) degrees of freedom is .7003.

Since the calculated values are greater than the table value, it is significant at 1% point. Therefore, the hypothesis H_0 is rejected and the alternative hypothesis H_1 that there is a high degree of consistency among the ranking of concepts by an individual is accepted.

When the overall rank of each category is taken and put in the ascending order, it falls in the PMEST order. The overall ranks for each category is

$$(P) = 50, (M) = 57, (E) = 84, (S) = 131, (T) = 157$$

The coefficient of concordance 'W' for the overall rankings 32 respondents were compute, $W = .858$.

H_0 There is no commonality in the way in which concepts are ranked by people/users

H_1 There is a high degree of commonality in the way in which concepts are ranked by people

In order to test the null hypothesis H_0 against the alternative hypothesis, Fisher's distribution was used for degrees of freedom v_1 and v_2 .

$$1 = 3.9375$$

$$2 = 122.06$$

The calculated value of $z = 2.616$ (this with $W = .858$). The table value¹ of 'z' = .599.

Since the calculated value is greater than the table value .599, it is significant at 1% point. Thus the null hypothesis H_0 is rejected and the alternative hypothesis H_1 that there is commonality in the way in which concepts are ranked by

people is accepted.

5 CONCLUSION

It may be inferred from the foregoing presentations that the sequencing of concepts in a given compound subject by specialists converge upon a common sequence. This common sequence simulates the PMEST pattern.

APPENDIX A

Ranking of Concepts in Compound Subject Sir,

When you are searching for books or articles on a subject in the library's catalogue or a bibliography, you will notice that the name of the subject is represented by a string of words (called subject headings) such as Children . Intelligence Measurement . Drawings. These are not in the normal English sentence form and the connecting words, such as conjunctions, prepositions etc., are not normally used. However, these minimum number of words arranged in a particular sequence are deemed to be adequate to give you an idea of the subject purported to be represented.

Namely "Measurement of children's intelligence through drawings".

1. However, various ways of sequencing the words in the subject string is possible, *e g.*

- (i) Intelligence . Measurement . Children . Drawing.
- (ii) Drawing . Measurement . Intelligence Children

Out of the various sequences, probably one of the sequence corresponds to the way human mind thinks and hence easier to understand.

2. Enclosed is a set of titles of periodical articles, with the substantive words underlined. You are requested to use these underlined words and sequence them, so that they communicate the theme of the article, in the best possible way

For example :

Title	"An <u>evaluation</u> of the <u>effectiveness</u> of a <u>telephone counselling center</u> ".
Sequence of words	Telephone counselling center. Effectiveness . Evaluation.

Please do not use any extraneous words, other than the underlined words in the title.

Soliciting your kind co-operation.

Thanking you,

Yours faithfully,
Hemalata Iyer

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- 2 *Effect of family setting upon cognitive development of the children in Europe in 1980.*
- 3 *A comparison of attitudes towards alcohol abuse of high school athletes and non-athletes in India in 1980.*
- 4 *Study of visual capabilities of kitten undertaken in India in 1979.*
- 5 *Influence of drug knowledge on drug attitudes of school students in India in 1980.*
- 6 *A study of attitudes of elementary teachers towards exceptional children in India during 1979.*
- 7 *Effect of contingency management on academic achievement of mentally retarded Arab students in Saudi Arabia in 1978.*
- 8 *Evaluation of Mexican American children intelligence in America in 1979.*
- 9 *Treatment of mentally ill patients in medieval England.*
- 10 *An analysis of job satisfaction among Engineering teachers in India during 1970.*

2.6 Ask Hypothesis and Ranganathan's Fundamental Categories

HEMALATA IYER

Information retrieval systems are based on matching of query representation with representation of text and retrieving documents that match. Suggests a new approach called by Belkin as "Anomolous State of Knowledge" (ASK) of the user where primary concern and focus would be resolution of problem and not information needs of users. The responsibility of resolving anomaly thus lies on the IR system and not on the user. Further the facted classification structure of Dr. Ranganathan based on 5 fundamental categories (PMEST) is being used to enhance the network representation of user needs

1 INTRODUCTION

Information retrieval systems have traditionally been based on the "best match" principle. Given a request for information in some form of representation, as a query, keywords, etc., the system responds by matching this query representation with the representation of the text, and retrieving these documents match

In the recent past this approach to IR has been questioned. Does the information request or query of the user really represent the information need of the user? Does the user not have a gap in his knowledge which is why he seeks the IR system? How then can the information request be taken to be an expression of information need, which is being done in all operational IR systems. The basic premise is that information needs are not in principle precisely specifiable. If so what then will be the basis for request/query representation? Any attempt to answer these questions demands a radical change in the way of looking at IR systems

The new approach recognizes that the most important element in the IR situation is the representation of information need of the user, which is arisen due to a gap in the state of knowledge of the user. Information need as such is often linked to the resolution of a problem. So as such the primary concern and focus should be the resolution of the problem and

(a) the semantic distance between two concepts in the mind is represented by the lexical distance between the word labels for these concepts.

(b) the association between the two concepts in the mind is inversely related to the lexical distance between the word labels for the concepts.

(c) the word labels for the central concepts in the individual's mind will appear most frequently in the text.

They used both abstracts and narrative problem statements to generate associative networks where the association between a pair of words is computed using the formula.

$$(1 / (1 + \gamma)) \times 100$$

$\gamma = 1$ if A and B are adjacent within the same sentence

$\gamma = 2$ if A and B are within the same sentence but not adjacent

$\gamma = 3$ if A and B are in adjacent sentences within the same paragraph (A and B refer to pairs of words within the text)

Oddy's^{7,8} experimental interactive IR system THOMAS is based on the ASK hypothesis. The system constructs an image of the user's need. The program operates upon a graph whose points represent documents, subject authors, and the lines stand for associations.

The structural properties of the image determine the selection of relevant documents and not mere matching of terms.

3 RANGANATHAN'S CATEGORIES IN THE NETWORK REPRESENTATION

Among other cognitive models, the faceted classificatory structure of Dr. Ranganathan based on the five fundamental categories PMEST can be used to enrich and enhance the network representation of user's needs. Dr. Ranganathan¹⁰ suggested a facet syntax for compound subjects that is free from linguistic and cultural influences. Such a syntax would reflect the arrangement of ideas that simulate the mental process of a normal human intellect in search of information. This he called as absolute syntax. The PMEST structure parallels absolute syntax.

Recent research on the psychological and linguistic aspects of PMEST structure⁵ and the ability of such a structure to communicate information with least distortion,⁹ have gone in

support that the PMEST structure has psychological roots, in the way human mind thinks and organizes concepts. Therefore this can constitute a cognitive model which can be effectively used in IR. However the important structural features are:

(a) The varying bond strength between the categories as postulated by Ranganathan and empirically evidenced by the psychological tests of word association.⁵ The bond strength between (P) and (M) is strongest. That between (P) and (E) is weaker than that of (P) and (M). The bond strength among levels of manifestation of the same category is stronger than any intrafacet bonds. Lastly the bond strength between a facet and its speciator is stronger than either the level cluster or intrafacet bonds

(b) Concreteness of the category is an important input. PMEST structure falls in the order of decreasing concreteness as empirically tested. Concreteness has a bearing on recall. The more concrete the category the greater the potency of recall and concreteness of the search also has a bearing on the effectiveness of the IR.⁵

Considering these structural features it would be useful to use the Ranganathan model for the ASK network representation, as it provides a conceptual structure for ideas/concepts.

4 PROBLEM STATEMENT AND NETWORK REPRESENTATION

The users narrative statement of their problem (and not their information need) is taken. The word association distance is computed for the Ranganathans categories occurring in the problem statement. This is done using the formula $(1/(1+\gamma)) \times 100$. The network representation is created for each of the problem statements. All this is done by the computer.

A sample of the network representations and the corresponding problem statements of the users is given in Appendix "A". It is interesting to note that the networks show clusters formed of concepts representing an aspect of the problem. In the case of problem involving a phase relation, it shows two distinctive clusters representing the two phases.

The search strategies are based on the bond strength between categories and their relative concreteness. The strategies broadly involve:

1 Linking concepts which are connected but whose association needs strengthening as the bond strength them is V strong

like (P) with (M) or (MP₁) and (MP₂).

2 Linking concepts which have strong bond strength but which are unconnected in the network.

3 Adding relevant new concepts to the network.

4 Ignoring the links between concepts which have very weak bond strength between them.

4.1 Example of Problem Statement

The starting node in the network is determined by word association distance. The cluster (nodes) having the highest value will be the starting point for the search strategies. In this example there are two strong clusters having the highest value of 1, namely Level, Instrument, Cognition and Self Concept, Sex role classification.

(a) Start with combining self concept (MP₁) and sex role classification (MP₂).

Subsequent strategies are determined by the bond strength between categories and the distance value between them is ignored. The latter is used only to determine the starting position in the network.

(b) Self concept (MP₁). Out of the three options available combine with Adolescent (P).

(c) Self concept (MP₁)—Measured (E).

(d) Measured (E)—BSRI (Sp to E).

(e) Go to the next strong cluster.

(f) Instrument (Sp to E). Out of the four options available, none of them represent the strongest bond strength, hence combine Instrument—measured-BSRI, creating a new link. All other options are ignored.

(g) Level (MP₃)—Maturity (MP₄). New link created.

(h) Level (MP₃)—differentiate (MP₄). Links strengthened.

Thus the search strategies are determined relying on the structure of the network and the bond strength between categories.

5 PMEST STRUCTURE IN SEARCH STRATEGIES

In connection with the efficacy of search strategies based on bond strength between categories it may be important and relevant to mention here, the results of another experimental study. In the experimental study⁶ done the PMEST structure was used for evolving search strategies. Loosening the searches were also done on the basis of the bond strength.

Strategies using different types of Boolean operators for different types of categories were standardized. Searches were conducted on the ERIC data base and user relevance estimated. The two control groups in the experiment were (a) a completely unstructured search—Quorum search as enunciated by Cyril Cleverdon and (b) the conventional Boolean online search.

The results indicate that searches based on Ranganathan's model performed at 30% greater precision than the two control groups, both of which performed at about the same level of precision. The results were statistically significant.

6 CONCLUSION

The role of structure in representing ideas in a subject surrogate has been well recognized, and Ranganathan's PMEST is one such. However the importance of structure in the retrieval process has not received adequate attention, though structure can provide cues/suggestions for searches. In particular Ranganathan's model has a greater significance because it has its basis on psychology. Therefore it can provide a framework for conceptual cognitive structure. The foregoing studies for a pointer that Ranganathan's model can be effectively used in developing the network representation of the user's problem statement, in evolving standardized search strategies to resolve the anomaly, thereby minimizing the intervention of the search intermediary.

A closer look at the Ranganathan's model in the overall context of computerized IR may be useful and may open up new possibilities.

APPENDIX

Problem Statement 1

I am conducting research concerning the relationships among sex role classifications as measured by Bem Sex Role Inventory (BSRI) and self concept in adolescents. I have been searching unsuccessfully for a reliable instrument that differentiates levels of cognitive maturity. Ideally I wish to differentiate concrete operators from formal operators. I need an instrument that will allow conclusions to be drawn concerning the ways in which levels of cognitive maturity may be related to self concept and sex role classification.

Analysis

Psychology (BS), Adolescent (P); cognition (MP₁); maturity (MP₂); level (MP₃); differentiate (MP₄); measurement (E)—instrument BSRI (Sp to E) as influenced by Psychology (BS), Adolescent (P); self concept (MP₁); sex role classification (MP₂).

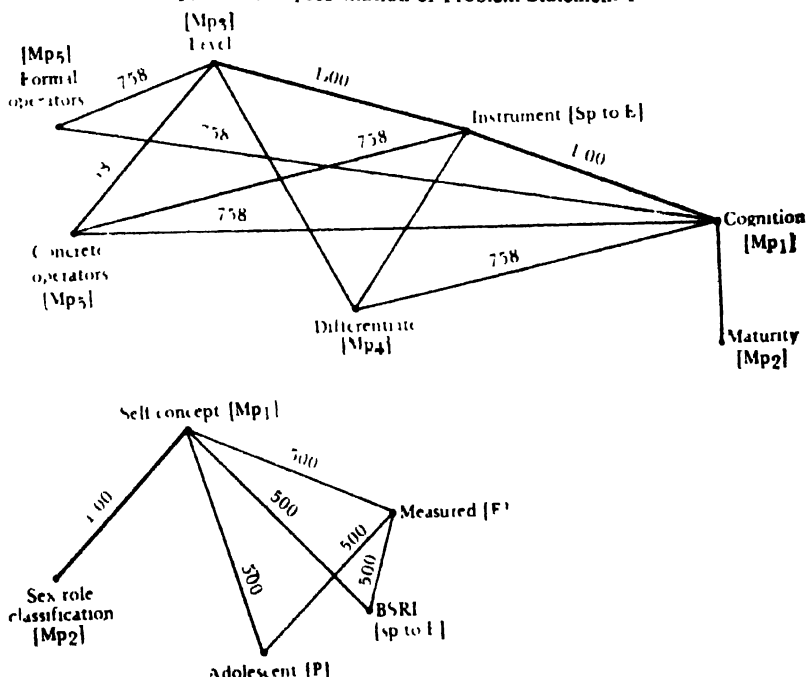
Problem Statement 2

I would like all citations relevant to the psychological effects of horror and violent films on the individuals as well as any societal effects. This includes feature films in theatres as well as made for TV films. Articles examining the effects of horror films on children as well as adults would be helpful.

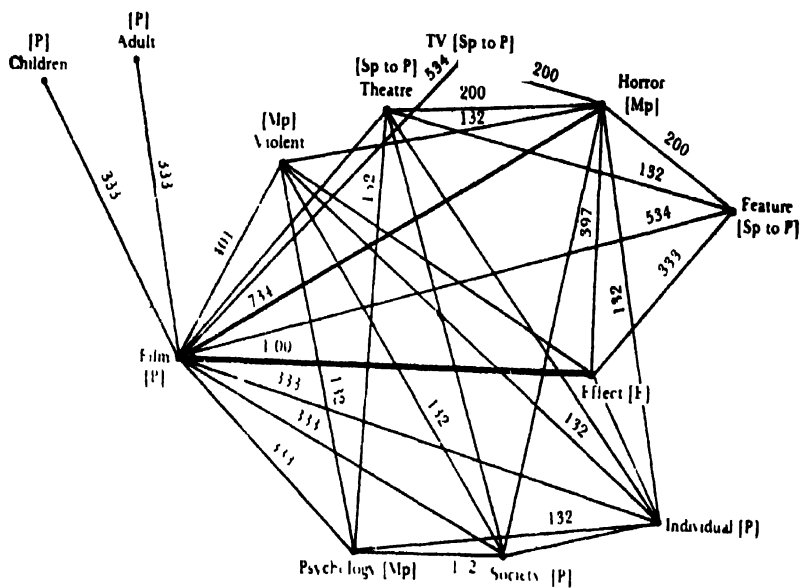
Problem Statement 3

There is a gap between research results and the utilization of these results by policy makers and practitioners. This phenomenon in Scientific Communications is sometimes called the "research utilization" or "knowledge utilization" problem. This phenomenon, and its potential remedies by co-operative international information dissemination, will be examined in the context of agricultural research.

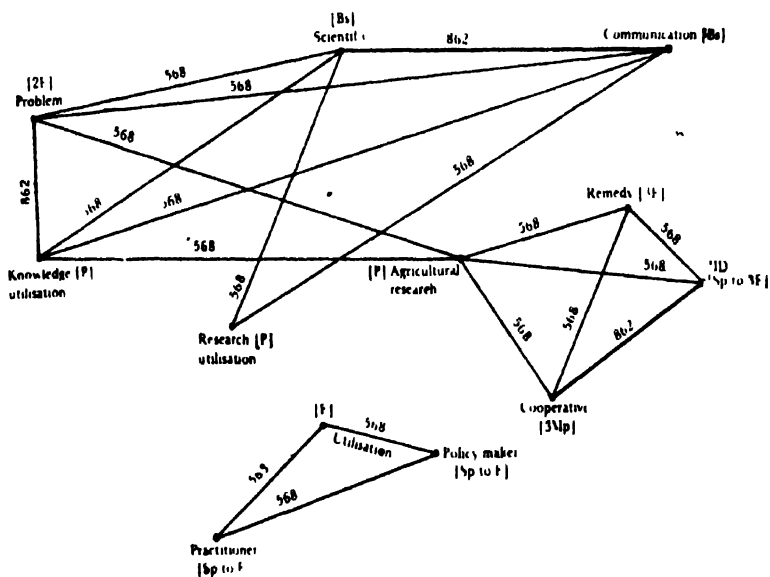
Network Representation of Problem Statement 1



Network Representation of Problem Statement 2



Network Representation of Problem Statement 3



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2.7 Ranganathan's Postulational Approach to Classification: Its Development and Impact

M M KASHYAP

After defining the concept 'postulate' and explaining what is meant by postulational approach, the genesis and progressive development of Ranganathan's Postulates for Classification are traced. It is observed that Ranganathan's Postulates of Facet Analysis and other principles going with them have been tried out, implicitly from 1933 and explicitly from 1955 onwards, both in the field of notational classification and verbal classification. Having been influenced by Ranganathan's theory of facet analysis, many other classificationists have developed innovative classification and indexing systems. They have not only followed Ranganathan but also extended his thoughts.

Today, the postulational approach to classification is not only being applied to develop conventional library-oriented classification systems, but also in the area of contextual indexing and faceted classification for generating and exploiting computerized on-line bibliographical databases. PRECIS, POPSI and Contextual Indexing and Faceted Taxonomic System (CIFT) are some examples. As such, a generalized postulate based classification and indexing algorithm is proposed, which can be used for classing and indexing documents. Practical application of this algorithm in arriving at a co-extensive or appropriate class mark or specific subject string pertaining to the topic of a document in accordance with postulates and principles (or rules) of any postulate-based classification and indexing system is discussed.

1 WHAT IS POSTULATIONAL APPROACH?

By approach we mean: a step or steps taken in setting about a task, problem, etc.; a method to be used or a course of action to be followed to do something. Consequently, postulational approach to classification can be said to imply postulate-based way of proceeding in classification or a postulate-dependent course of action or process involved in classification of documents or their surrogates.

Having explained briefly what is meant by postulational approach to classification, let us now deliberate on what exactly is a postulate and what is the process involved in postulational approach to classification?

2 WHAT IS A POSTULATE ?

A postulate is an assumption or a principle or a guideline ;

- (i) which cannot be proved to be true or false by means of sense experience;
- (ii) which is not self-evident; but
- (iii) which it is useful to assume for a certain purpose a necessary condition to do something or to develop any system of thought.

A postulate is a statement or a proposition which is offered and presumably accepted as true, without further proof. It is a statement about which we cannot use either of the epithets *true* or *false*. We can only speak of a postulate as *helpful* or *unhelpful* to the purpose it is used.

A postulate is distinguished from (i) a presumption, (ii) an assumption (which is other than a postulate); and (iii) an axiom.

A *presumption* is a statement or proposition supported by a probable and not conclusive evidence and which is accepted as true because of its reasonableness or high probability.

An *assumption* (which is other than a postulate) is any statement or proposition

- which may be self-evident or
- which may be proved to be true or false by sense-experience but
- which is taken as true for the time being for a certain purpose in hand.

An *axiom* is a statement or a proposition which is self-evident.

The postulates of sciences are functional devices useful for job to be done, though they are not based on objective experimental evidence. The formulation of postulate is guided by deliberative and reflective thinking as well as by intuition.

A postulate may be theoretical (or scientific) or practical (or moral). A postulate is theoretical when it is needed or made use of for the attainment of knowledge, like the postulate of 'universal causation'. It is practical when it is needed or made use of for a performance of action, like the 'postulate of freedom.'

Scientists employ postulates to interpret the observed facts

necessary to produce verified facts or knowledge about something. For example, the *Postulate of the Uniformity of Nature* is one such assumption according to which: "There are such things in nature as parallel cases; that what happens once, under sufficient degree of similarity of circumstances, happens again and not only again, but often as the same circumstances occur."¹ This postulate can be expressed in other ways also – like 'nature is uniform'; that 'the same cause will under similar circumstances be accompanied by the same effect'; or that 'nature operates according to certain patterns of regularity'.

The implication of this postulate is that on the basis of some cases of observed instances, one can draw an inference that applies to a collection of similar instances, that is, what is true of some members of a class is also true of all members of the class. In other words, this postulate directs us to search for an explanation or a cause of something in regularity that apparently underlies a phenomenon.

The application of this postulate allows us to formulate a plausible hypothesis, and makes better prediction or explanation of something than would be possible by sheer guess work.

Similarly, postulates for classification as enumerated by Ranganathan and other classificationists, serve as guiding principles or rules for classification of subjects or designing of verbal and notational classification system (also known as classification and subject indexing systems) and correspondingly classing of documents or their surrogates in a desired and helpful order.

The postulational approach to classification, which was first enunciated by Ranganathan, has put the theory of classification and works of classing documents on a firm scientific basis.

His postulational approach is being increasingly applied both in 'organising classification systems'² aiming at grouping or classing of documents or their surrogates in hierarchical order and in 'associated classification system'- aiming at clustering the surrogates of documents in non-hierarchical groups or clusters.

3 GENESIS AND DEVELOPMENT OF POSTULATES FOR CLASSIFICATION

As indicated in the previous section, it was Ranganathan who

took initiative to apply consciously the postulational approach to classification by formulating a set of postulates (or principles of facet analysis) for designing a scheme for classification as well as classing the documents according to their specific subjects. Ranganathan presented these postulates at the *International Study Conference on Classification for Information Retrieval*, held at Dorking in 1957.³ Though, the postulates were stated or enunciated for the first time by Ranganathan in his paper presented to the Dorking conference, yet these were actually used by him earlier, implicitly, in designing the Colon Classification published in 1933.⁴ Perhaps same can be said for almost every other scheme for classification (both verbal and notational), published prior to Colon Classification ed 4 (which was the first edition of C C based on explicitly stated postulates). All these classifications were based on a set of postulates, only the situation was that in almost all the cases the postulates were implied, not explicitly stated.

While enunciating his postulates, Ranganathan expressed the view that "it is helpful to clear thinking and further development, if a scheme of classification can be based on system of explicitly stated postulates which lay bare the unexpressed assumptions implied in thinking. The postulates can be mostly separated into those concerning the idea plane and those concerning the notational plane. Those belonging to idea plane are universal—that is, they should be respected by any analytico-synthetic scheme of classification.⁵ According to him the postulates for the idea plane are intrinsic to the universe of knowledge/subjects and should, therefore, be helpful in designing any scheme for classification. But the postulates of notational plane may vary from one scheme of classification to the other. Further, once a set of postulates is accepted, then its constituents should not be changed light-heartedly. They should only be changed if overwhelming factors arising out of unexpected changes in the way of approaches of the readers or if social purpose of library compel for a change.

Ranganathan also specified that the postulates, as formulated by him, were a part of the progressive development in classification theory starting from W.C. Berwick Sayers who had developed a set of canons of classification as early as 1915,⁶ a draft of which was further re-examined by H.E. Bliss,⁶ later.

The set of idea plane postulates, as enunciated by Ranganathan in his Dorking Conference paper, is listed below:

1 Any class is either a basic class capable of forming a subject by itself (e.g. agriculture), or an integration of a basic class with any number of isolates which are not capable of forming subjects by themselves—i.e. unless integrated with a basic class. Examples of such isolates in the above examples are disease, cure, biological means, Madras, deltas, 1957, or wet season. A third type of class is formed by the integration of two or more classes, each of which forms a phase of an overall class: e.g. J381: 4: 60gF 'Cure of crop diseases as the basic phase, 'Chemical technology' is the second phase, and the phase relation is 'Influenced by', denoted by the digits 0 g.

2 Any facet or isolate is a manifestation of one or other of the five fundamental categories—personality, matter, energy, space, time. These are mentioned here in the descending sequence of concreteness. In each round the facets should be assembled in this sequences. As a result, the documents will get arranged on the shelves and their entries in catalogues, in a helpful sequence.

3 Energy facet may repeat itself more than once in a subject. The sequence of such energy facets will be determined by the nature of the subject. In other words, the Gestalt of the energy facets of a subject is more or less unique as far as our present-day way of thinking goes. For example, cure can come only after disease. Method of administering the means of cure, which may be an energy facet of a still later round, can come only after cure.

4. Any energy isolate can start a new round of isolate. Disease, we have the second round consisting of the personality isolate Virus and the energy isolate Cure. Again after cure, we have the third round consisting of the personality isolate Biological means; this may be followed by the energy isolate administration (of the means). After Administration we may have still another round the fourth, with perhaps the Instrument used for administration as the personality isolate in it, and the material of which the instrument is made as the matter isolate in that round.

5 Space and time isolates can occur ordinarily only after the last round.

6 Personality and matter isolate may occur more than once in one and the same round. They will occur in consecutive facets for personality first and for matter next. Each such facet is called a level of the fundamental category concerned. The sequence of levels will be determined uniquely by the nature of the subject, as the present-day way of thinking goes.

7 The isolates in a facet may be formed on the basis of one or more characteristics. The isolates formed on the basis of one characteristic form an array; the totality of characteristic belonging to one facet is called a train of characteristics."³

These postulates were also incorporated, somewhat in an elaborated form, by Ranganathan in his *Prolegomena of Library Classification*, ed. 2 published in 1957⁷ after dropping postulate No. 1 of the Dorking Conference paper, even though this postulate (relating to Basic Subject, Compound Subject, and Complex Subject) was and is still a very significant one. In the absence of this postulate, the other successive postulates, particularly the *Postulate of Five Fundamental Categories* appear to be hanging in the air. Nevertheless, in the modified version of these postulates, which was published in 1958⁸, Ranganathan incorporated this postulate in a different format while retaining its essence. In this paper he has also explained, with illustration, the application of postulational approach in classifying a document on the basis of a faceted scheme for classification. Against each successive step in the process, Ranganathan indicates the plane (i.e., idea, verbal, notational) to which that step belongs, and the postulates involved in that step.

The enunciation of the postulates became more sharpened, clearer and simple in his later books, namely: *Colon Classification*, 1965⁹ and *Prolegomena to Library Classification*, ed. 3, 1965.¹⁰

4 APPLICATION OF THE POSTULATES IN SUBJECT INDEXING

One of the many major contributions of Ranganathan in the field of library and information science is *Chain Procedure*, the first version of which was published in 1939¹¹. It is a device to derive subject headings from a class number mechanically—that is, without reading the book and determining its specific subject. This method is based upon Ranganathan's theory of symbiotic nature of classification and cataloguing.

Ranganathan was of the view that once the class number is determined on the basis of a postulate-based classification system the specific subject heading of a document can be derived by verbal interpretation of the class number and consequently deriving the subject headings, for subject catalogue, with the help of the chain indexing technique. That is, to begin with his view was that subject headings derived by chain indexing are dependent on notational classification. However, he changed his view later.

In 1964¹² he suggested that specific subject entry to each document can be derived independent of a class number on the basis of 'Postulates of Facet Analysis'. In Ranganathan's own words :

The postulates for Facet Analysis and the Principle for Facet Sequence are of as much help in finding out the names of the Specific Subject of a document and in rendering it in the Subject Heading, as they are in establishing its Class Number. The tasks of cataloguing and of classifying are equal beneficiaries of these postulates and principles. The use of one and the same procedure in cataloguing and classifying does not warrant the assumption of subject heading being derived from class number or of class number being derived from subject heading of two different branches A and B of one and same tree, we do not say either A stems from B or that B stems from A.¹³

The factors, which made Ranganathan to realize that the *Postulates of Facet Analysis* can also be applied in the domain of subject indexing (in addition to and independent of notational classification) appear to be the following:

- 1 Impact of the research carried out in the field of classification and indexing by Classification Research Group (CRG)^{13,17}, London, from 1952 onwards.

- 2 Application of chain indexing techniques in British National Library and the use of Facet Analysis for verbal extension of D C class numbers, in every case where the class number was not co-extensive. (The co-extensiveness could not be achieved due to the limitation of D C number building system, and verbal extension was carried out to provide relevant access points through chain indexing in the alphabetical part of BNB).

3' Explicit statement of the postulates by him in 1955 and their refinement in later years.

Ranganathan was very receptive to the ideas coming from any direction and could assimilate them to form part of his total knowledge. He had immense capability to catch other people's ideas; identify the potentiality of immature/budding ideas of significance, reflect on them, and modify or extend them quickly and purposefully.

Ranganathan seems to have distilled and developed the 'Postulates of Facet Analysis' out of Aristotle's concept of "Categories" and pragmatic structure of the UDC. We can also visualize the influence and extension of DDC's and UDC's notational systems in his Colon Classification.

Though Ranganathan's ideas of "Facet Analysis" influenced the British librarians as early as 1950s, particularly through the efforts of Palmer and Wells,¹² at the same time the contributions made by B. C. Vickery, A. J. Wells, D.J. Foskett, J. Mills, D. Austin, E.J. Coates, J. Aitchison and others in the field of classification in general, and indexing, in particular, brought to bear a lot of influence on his thinking.

For instance, in his article *Subject Heading and Facet Analysis*¹² Ranganathan not only confirmed the following argument of Coates¹⁵ but also demonstrated for the first time the application of his 'Facet Analysis' in deriving subject headings without using class numbers.

The abstraction of the overall idea embodied in the subject content of given literary unit, besides being basic to most forms of subject cataloguing is also the most important process in subject classification. The two disciplines only diverge at the subsequent phase in which the abstract idea is reformulated by subject cataloguer as a subject heading and by the classifier as a classification symbol, both techniques provide answers to the question, 'What is the subject of the document'. Which are different in form?

The affinity between subject cataloguing and classification does not cease here. Every form of subject catalogue attempts to assist the enquirer by providing links between related subjects, and we shall see that as soon as we attempt to construct coherent and comprehensive systems of such links, we encounter classificatory ideas. We shall see also

how classification has sometimes been employed for rationalizing the word order of compound subject headings. No attempt is made here to respect a frontier which exist only in tradition and in professional examination syllabus where, in the writers view its abolition is long overdue.¹⁵

Later in 1969, Ranganathan while tracing the development of his views regarding the application of the postulates in the domain of subject Indexing or verbal classification, indirectly indicates the impact of the contributions made by CRG (London) in the field of Subject indexing on him. He states :

My Own Wrong Impression

In the early years, I was under the impression that the class number of the subject of a book should be fixed before its Subject Heading could be derived from it. This impression was due to the practical procedure followed and recommended in 1937 for classifying a book. The same wrong impression was perpetuated in another book in 1947. This wrong impression was again reinforced in the same year in a book by K. M. Sivaraman.

3 EMERGENCE OF CORRECT VIEW

31 Foundation

The first foundation for the correct approach in the matter was in 1957 in terms postulates for classification. This foundation was refined in 1958.

32 Systematic Procedure for Subject Analysis

The refinement in the postulational approach to classification led to a systematic procedure for classification. A full account of this systematic procedure was given in 1962.

4 GENERAL MISCONCEPTION

Even after the systematic procedure for classifying, without any dependence whatever on a predetermined facet formula, has been established, the implication of the systematic procedure for establishing the subject heading of a book without dependence on class number, was not realized for another two years. Some adverse writings on the *British Technology Index* started in 1962, disclosed a misconception about Facet Analysis. It implied the belief that Facet Analysis

was either by itself classification or that it was a technique designed exclusively for classification. This is not correct. On the other hands, Facet Analysis can be used for three different purposes.

1 Help in the construction of the class number of a document;

2 Help in the precise formulation of the subject requirement of a reader; and

3 Help to the construction of the subject Heading of a document.¹⁶

The advantages of application of postulational approach in the designing of indexing system, which is independent of a classification system as well amenable to computerized retrieval system, became apparent on the basis of research carried out during NATO Science Foundation grant in UK from 1963-69 (Note : The research carried out during the period of NATO grant has been described in detail by D. J. Fosket¹⁷ and D. Austin.¹⁸)

The major outcome of this research was the designing of preserved Context Indexing System (PRECIS) by Derek Austin¹⁹ for BNB. This system is postulate-based specific subject indexing system, independent of classification; and, which overcomes the principle disadvantages faced by BNB editors in consistent and logical application of chain procedure to the DC class numbers.

This system has also been greatly influenced by Ranganathan's 'Chain Indexing' technique and his postulational approach to subject indexing, as can be seen from the following statement of the author :

It might be possible to trace the origins of PRECIS back in a series of steps to Bacon to Aristotle (the usual target in these exercises), *starting with, say, chain indexing at a first remove* (italics mine), then following a rout marked by names such as Kaiser and Cutter.²⁰

5 POSTULATE-BASED VERBAL CLASSIFICATION SYSTEMS

Ranganathan's postulates for Facet Analysis and other principles going with them have been tried out from 1933, implicitly, and explicitly from 1955. We have also seen that

postulational approach is applicable both in the domain of notational classification and verbal classification, as well as in classing the document(s) or surrogates of documents on the basis of a postulate-based classification system.

After Ranganathan, many other classificationists have followed his example in designing general as well as special postulate-based classification systems; some of the major postulate-based classifications which have been recently designed on the line of Ranganathan's approach are described below:

51 *Derek Austin's PRECIS*

PRECIS²¹ is based on a set of postulates or schema of role operators and codes for formulating the PRECIS string to represent the specific subject of a document and producing PRECIS index, based on shunting procedure. Practical example of PRECIS can be seen in the indices to be the *British National Bibliography* and the *Australian National Bibliography*. In these and other cases it is used as two stage index, i.e. the entries in the alphabetical subject index refer to class number and the user has to trace catalogue entries in a separate classified sequence.

"Recently PRECIS has also been used to produce one stage index, where each entry in the index is followed immediately by a brief catalogue entry, so that it resembles in some respects, a traditional subject heading system."²² An example of this kind of output, is the *British Education Index*. It is also being used in an on-line system. For example, any term or word in PRECIS string can be used as a retrieval key, when searching the British Library on-line files.

52 *Postulate-based Permuted Subject Indexing (POPSI) System*

POPSI system²³ is a purpose-oriented, postulate-based organising classification serving as the source of derivation by permutation of all kinds of possible associated classifications to supplement it in a definite context. It is an innovative verbal classification system based on primarily re-defined Ranganathan's postulates in lucid and innovative way, by Bhattacharyya.

The system has evolved out of the research carried out by *Classification Research Group (CRG) India* under the direction

of Ranganathan, starting from the publication of his paper in 1964 on the application of his postulational approach in the domain of subject indexing. This system is amenable to computerization. Devadason has done significant research on computerization of POPSI.

53 Dahlberg's Information Coding Classification (ICC)

Dahlberg has based her classification on "Referent Oriented Analytical concept Theory".^{24,25} The concept theory postulates that elements of classification system are 'Scientific concepts' or 'formal concepts'. The organization of concepts (units of knowledge) in ICC²⁶ is based on combinability of concepts from the categories of being (or general entities), with categories of form (general aspects/properties/determination of being) on many levels in many possible ways of specification, he has enunciated 9 'categories of being' and 12 'categories of form'.

54 James D. Anderson's Contextual Indexing and Faceted Classification for Data-bases^{27,28,29}

This Contextual Indexing and Faceted Taxonomic Access System (CIFT) has been developed by James D. Anderson and his associates, as a part of the Bibliography Revision Project of Modern Language Association (MLA) of the United States. Beginning with 1981 publications, it is being used for indexing and classifying entries in the *MLA's International Bibliography* and on-line data-bases.

This system is like the POPSI system, and based on Ranganathan's theory of 'Facet Analysis'.

Since long, we recognize that major mean of access or approach to documents by readers is by subject. As such, the need arises to develop effective systems, such as postulate-based classification systems, to classify and arrange the documents or their surrogates in a helpful order.

Today, the postulational approach to classification is not only being applied to develop conventional library-oriented classification systems; but also in the area of contextual indexing and for searching computerized on-line bibliographical data-bases by facet analysis approach. PRECIS, POPSI and CIFT systems are some of the examples of such classification systems, as has already been mentioned.

We also find that almost all postulate-based classification system (both verbal and notational) have developed their own

procedure or steps for classing documents or their surrogates. There is a need for a generalized algorithm/procedure for classing documents or surrogates of document(s) either by a notational classification systems or by a verbal classification system. Keeping this fact in mind the author of this paper has developed a generalized algorithm for analysis and representation of subject contents of documents, which can be used by any classification system. The brief description of the algorithm is given in the next section. (For details refer Kashyap.⁵⁹)

6 ALGORITHM FOR ANALYSIS AND REPRESENTATION OF SUBJECT CONTENTS OF DOCUMENTS IN A DOCUMENTARY LANGUAGE

In this section, an effort has been made to state the logical steps involved in establishing and explicitly expressing the specific subject of a document in natural language and to translate it into classificatory language and/or Indexing language descriptor phrase of a postulate-based verbal or notational classification system.

In other words, these steps can be applied independently of any particular subject-indexing or classification system; and a classifier or an indexer can arrive at an appropriate precise and accurate class-mark or specific subject string or specific subject heading pertaining to a topic or a theme of a document in accordance with postulates and principles (or rules) of any postulate-based classification or indexing-system.

The major steps involved in this process are:

- Step 0 *Raw Title Statement*: In this step the title of a document is stated in the form provided in the document.
- Step 1 *Formulation of Expressive Title*: In this step we are concerned with the identification and stating, in natural language, the specific subject or subjects treated in a text or publication. This step constitutes the following set of activities:
 - (a) analysis of the contents of documents;
 - (b) determination and establishment of specific subject(s) dealt within the document; and
 - (c) representing it/them in the form of Expressive Title Statement(s).

Step 2 *Kernal Title Statement*: This step constitutes stating the full or expressive title minus all the auxilliary and insignificant words such as 'an', 'the', 'of', 'to', and so on.

Step 3 *Formulation of Descriptor Phrase*: The process of formulating descriptor phrase; that is, translating the natural language subject statement into a documentary language expression, which is derived on the basis of its postulates or guiding principles of a classification system, consists of series of activities as below:

1 Construction of Raw Descriptor Phrase;

2 Categorization of its Kernal concepts (descriptors) on the basis of postulated categories of the applied system;

3 Re-arrangement of Raw Descriptor Phrase in documentary-language postulated syntax or citation order;

4 Replacing non-standard terms into current standard terms, consulting a given authority list(s);

5 Formulation of Descriptor Phrase in Classificatory language (i.e., class mark); and/or Formulation of Source Descriptor Phrase (i.e., Primary Subject Heading). Derived descriptor phrases (i.e., Secondary subject headings), and establishment of related terms for providing cross references.

6 Verification or checking of the descriptor phrase;

This process is basically an analytical process and has no fixed sequence of a fixed number of activities. It is a process in which each step can feed back and forth to every other step.

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2.8 Hidden Roots of Colon Classification

P. S. G. KUMAR

Traces the history of classification as related to ancient India. Gives some of the India mystical concepts in relation to Ranganathan's classificatory concepts like, universe, three planes, fundamental categories, facet and focus, connecting symbols, seminal mnemonics, etc. Concludes giving the reasons for the choice of the topic, opinion of late Dr Ranganathan, and further discussions with him.

1 INTRODUCTION

Ever since the dawn of human knowledge and experience, a system of classification has come into practice in order to differentiate and distinguish one thing from another. Human thought has undergone rapid and radical growth, keeping pace with the ever changing universe. This necessitated the acquisition of capacity to distinguish between things and to develop the art of differentiation. The intuition (Divya-indriya) of the sages and seers ultimately brought into light some vital principles that govern the creation. The two-way approach of the intelligentsia of the bygone days towards physical and metaphysical world has evolved a high state of society laying down certain principles with regard to individual (*vyakti*) and society (*samashti*) as a whole, with a spectroscopic view of their position, relation, rights and responsibilities in all fields of human life. Our people have laid down a great stress on society; and hence evolved as a socio-centred system.

2 CLASSIFICATION IN THE PAST

The Indian society was classified by applying the characteristic of activity into four groups, i.e. *Brahmin*, *Kshatriya*, *Vysya* and *Sudra* and attributed some qualities and duties to each of them. They also classified knowledge on the basis of fundamental values into four groups—*Dharma*, *Artha*, *Kama* and *Moksha*. This is called the vedic system of knowledge classification, rightly pointed out by Dr Ranganathan as the earliest system

known to humanity. *Dharma* included the modern subjects denoted by law, theology, ethics and sociology. Ethics can be regarded as compendium of social behaviour which depicts duties and responsibilities of every person in society. The second category *artha* included the modern subjects denoted by economics, political science, engineering, etc. *Kama* included literature and fine arts. The fundamental value *moksha* included the modern subjects denoted by metaphysics and spiritual experience. Thus, the society in the past is a systematized and well organized one. It had classified knowledge and people and their duties in all walks of life.

3 MANIFESTATIONS—CONCEPTUAL

In the sacred Vedic scriptures *Prajapati* (= *Virat Purusha*) was regarded as the eternal substratum, substance, and principle of creation.

The *Virat Purusha*, the creator exists in two forms, one 'Virat Purusha—Manifest' and 'Virat Purusha—Unmanifest'. The form manifest occurs as *Panchabhuta*, five elements of creation on material plane and unmanifest in the cosmic life principle as *Agni*.

21 Three Planes

Agni is three fold. *Agni* is the unique principle behind all this universal manifestation, which we see in three forms, plants, animals and men. Organic life is found only on these three planes and this constitutes a basic trinity, viz., matter, life and mind, which in Vedic terminology correspond to the three divisions of the world, the terrestrial, atmospheric and celestial. These are not spatial conceptions but planes of consciousness. In classificatory language Idea Plane correspond to mind, Verbal Plane correspond to matter and the Notational Plane to life.

22 Fundamental Categories

Agni as a terrestrial diety manifests himself as the five elements of creation. These are *Vayu* (gas); *Prudhvi* (solid); *Teja* (energy); *Jala* (fluid); and *Akasa* (space), These were regarded as the basic concepts that are responsible for the formulation and manifestation of the entire creation. The plant or animal should necessarily depend either directly or indirectly on the

universe which is a complex of five fundamental elements cited above. In plant for example, it needs for its existence first of all soil for its firm anchorage. Water which is a combination of hydrogen and oxygen, takes a major part of the carbohydrate which is the organic matter; air for its living breath that is respiration; solar radiation, the source of heat for photosynthesis to result in the personality of the plant, which manifests itself in the fifth element *akasa*. (*Akasa* is not that which is at few kilometers distance from the earth but that which prevades or surrounds the earth).

23 Concepts Inrelation to Categories

Vayu can be equated with the concept of time. The period of existence depends upon the oxidation process of the plant or animal body. The season and meteorological factors do depend on air. *Purdhvi*, the earth which is in correspondence with the concept of space needs no elaboration. Next is *teja* or energy. It is a well-known fact that solar radiation is the chief source of energy. The life activity photosynthesis is governed by solar energy. The potential energy needs heat for transformation into kinetic energy for life activity. *Jala* or water, which is a chemical combination of hydrogen and hydroxyl ions can be compared to the matter facet of the universe of knowledge. It is the water that forms the raw material for the formation of the organic matter—the carbohydrate. It is the vehicle which absorbs and translocates the minerals in the plant body and synthesized food to various organs. The final one is *akasa*, the personality which is a result of the combination of the various things, so also, *akasa* contains air, particles of sand (dust), humidity (water vapour), micro-organisms and also radiates solar light through it. It is noteworthy in classification that at times, any of the remaining facet may impersonate personality facet.

3 MANIFESTATIONS—CONCRETE

31 Facet and Focus

The facet can be regarded as the 'body' and focus can be the 'soul', the inherent life of the facet. Facet and the focus are the two which are inseparable.

32 *Connecting Symbols*

The five connecting symbols are the *panch prana* or the five senses regarded as soul. If these are lost, the life is lost, so also, if the connecting symbols are not there, the facet becomes meaningless.

4 MANIFESTATIONS—SPIRITUAL

41 *Seminal Mnemonics*

The seminal mnemonics of Dr Ranganathan are of high value to classification. They express a recurring representation of a certain idea by a certain digit, *i.e.* a digit—idea correlation.

411 *Light from the Vedas*

The thought of *Rigveda* is cast in the mould of symbols. The symbol is employed to convey an esthetic meaning. The symbol may constitute a language. The sun, the moon, the fire and water. . . are some of the eternal pegs fixed in the cosmic vault. These symbols and numerals possess a great value as pointers of mystical meanings. For example 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 24, 27, 33, 34, 36, 44, 48, 60, 90, 100, 1000—these numerals punctuate a rich and colourful spectrum of cosmic meaning and universal metaphysics formulated by the *rsis*. This language of *Rigveda* is not to be traced in the lexical mould of apparent words and meanings. It is essentially the language of symbols, phonemes designed to explain the mystical working of the cosmos on the parallel planes of life (*prana*), mind (*manas*), and matter (*vak*).

412 *Identity of Patterns at Seminal Depths*

Let us take an illustrative example, the Vedic cow. The cow is par excellence the symbol of living organism. She eats simple grass and fodder produced by rain water. The mysterious chemistry of the cow's body converts water into milk. Now what is the difference between water and milk? Milk is water permeated by tiny globules of butter. Then how does milk get its butter contents? The mystery of butter gives the answer. The seers point out 'butter is fire'. *Fire is put out by water. Butter and fire are identical brands as both being forms of

*It was known from Vedas that *Agni* originates from water. The symbolism is explicit with reference to the lightening produced in the clouds.

energy. It is very interesting to note that Vedic seers equated house hold jar as the symbol of the cosmos and the human body full with all the possibilities of existence and the familiar pestel and mortar signify the two clashing rocks or the opposite principles of *prana* and *apana*. *Akasa* speech or *vak* are equated on one plane. All these show that 'every thing is related to every thing else' and we have to identify even spiritually the patterns at seminal depths.

413 Seminal Mnemonics in Alphabets

The Sanskrit alphabets are pregnant with mystical meanings. So far they were not captured and made use of in classification. Here follows some of these letters bearing seminal mnemonic value in Vedas : क (Ka)=Prajapati; ख (Kha)=Akasa ; गे (Gow) =Vak, Agni, Sound, Energy ; ज (Ja)=Evolution ; ल (La)=Death.

5 CONCLUSION

51 Choice of the Subject

When I was a student of Library science at Andhra University in 1969 taking my first lessons in library science, I was much fascinated by the contribution of Dr Ranganathan, whose ideas were universal, though 'his language was that of the East'. His works were punctuated with similes drawn from the various epics, *puranas*, and *shastras*. When it was the question of reference service, he referred to *Ramayana*; he related the five laws to Lord Narayana. Documentation to *Kurmavatara*; and so on. This clearly shows the impact of Indian science and spirituality on Dr Ranganathan. It was with this background that I tried to trace out the roots of *Colon Classification* from the ancient mystical concepts.

52 Reaction of Dr Ranganathan

The ideas presented in this paper were jotted-down some 16 years ago and presented to Dr Ranganathan. Following are some of his comments :

- 1 I am glad of your interest in mysticism.
- 2 I cannot say that I had real mystic experience. But I have come in close contact with real mystics.
- 3 When I began to design *Colon Classification* I had unknowingly used the digits in a particular way. It was only

later that a mystic who saw my scheme told me that the digits conformed to the mystic tradition, both of India and of Chaldea.

4 This made me call them seminal mnemonics.

5 Your paper goes into the very heart of mysticism. It is very interesting. But a classification scheme should not consciously get involved in intellectual things of that kind. Because the analogies, particularly the diagrammatic representation, may carry us along wrong lines though they may furnish some thing or other in a scheme. Of course, a true mystic can devise a scheme in a spotless way. But according to me, no mystic would care to take up such a piece of work.

53 My Reply

In my reply I mentioned to him that :

1 The study aimed at bringing out the conceptual identity of the basic concepts of CC with the Indian mystic tradition and philosophy ; and also the impact on the classificationist;

2 Such a study shows a way in resolving problems of classification by reference to the rich ancient Indian thought;

3 In the study of the seminal equivalents, analogies and symbolic representations do help the classificationist and classifiers ;

4 If identity of patterns at seminal depths is advanced to a fuller degree, the scheme for classification will be spotless. Further, such a scheme shall have more of common isolates and a very few special isolates. It can perpetuate for ever. It is true that only a true mystic can devise a scheme in a spotless way.

54 His Reply

In his reply Ranganathan said :

2 I quite appreciate your justifying the explanation of the Vedic equivalents of some of the concepts in CC.

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2.9 Disciplines, Forms and Phenomena

D. W. LANGRIDGE

Of the two major influences on modern thought in classification one is techniques used by Dr S.R. Ranganathan for analysing phenomena and their relationship and other is positivist philosophy. Dr Ranganathan had provided the best model for dealing with categories, citation order and detailed specification of compound subjects. In modern classification, the form characteristics of documents usually are—form of knowledge, mode of writing, viewpoint, Genre, symbolic medium, structure of text and intended audience. Colon was considered to be advanced as it took into account philosophical considerations but the new edition of BC has surpassed it now.

An American philosopher, J.H. Randall, distinguished between the world *for* knowledge, assumed to be one and the work *of* knowledge which is many. In everyday life we refer to the world *for* knowledge in terms of things, abstract and concrete, their parts, properties and actions; while bibliographic classification attempts a more precise and complex categorisation. In dealing with these categories of phenomena, in producing the world *of* knowledge, writers begin from different premisses, take differing standpoints, use differing methods and hold differing aims. It is not enough, therefore, in subject analysis to specify merely the topic of a document, the phenomena with which it is concerned. If we are to make the most significant distinctions between documents, if we are to give the maximum help to users in meeting their precise needs, then the nature of the writing must receive the same careful analysis that has been devoted to phenomena.

There appear to be two major influences on modern thought in classification. One is the techniques used by Ranganathan for analysing phenomena and their relationships, the other is positivist philosophy. For some time after the appearance of Colon Classification research workers in Europe and America concentrated on the problems of special subjects, particularly in science and technology. Ranganathan provided the best model for procedure in dealing with categories, citation order

and detailed specification of compound subjects. Within such narrow confines philosophical problems hardly arose. Theoretical writing that followed this work tended to generalise from the findings in science and technology to the rest of knowledge which was treated as a homogeneous whole. Important differences between the various forms of knowledge were overlooked. The philosophical basis for this enterprise seems to be a rather vague conception of positivism, a belief that science is a model for all knowledge and that other kinds must conform to its criteria. In fact, a conscious examination of positivism shows that its distinction between science and other forms of writing argue *against* the homogenizers. Confusion arises because the positivist definition of knowledge is so restricted. In bibliographic classification we are concerned with all forms of writing, irrespective of their epistemological status. That positivism is invalid as a guide to general classification is obvious when we consider that Comte's universe of knowledge was exhausted by the six science of mathematics, astronomy, physics, chemistry, biology and sociology; or that a later writer, O.L. Reiser, could design a 'temple of knowledge' that found no place for history, religion and the arts.

Positivism gives us merely a dichotomy of science and the rest, but there are many philosophical works that discuss comprehensively the various distinctive forms of knowledge. Their common argument is that different modes of apprehending the world *for* knowledge produce distinct domains in the world *of* knowledge; that these domains are few in number and stable in nature. Most modern classificationists are apparently unaware of this literature, one result of which is a widespread failure to distinguish between *fundamental* disciplines (or forms of knowledge) and disciplines in the looser sense of subject specialisations. When the Classification Research Group turned to the problems of general classification they rejected disciplines as too unstable to form the basis of a scheme; but this is true only of disciplines in the specialisation sense, not of fundamental disciplines. The suggested alternative, integrative levels, is a theory of nature and therefore applicable only to those classes of knowledge concerned with natural phenomena. At best it could be extended to social science, though attempts to do so have been unconvincing. To philosophy, history, religion and the arts it is obviously

irrelevant.

Existing general schemes do not give much guidance in this matter. They are sometimes referred to as 'discipline' schemes, implying that disciplines take priority over phenomena in citation order. This is very far from the truth. In most schemes, for example, the fundamental disciplines of philosophy and history are widely distributed and even science is not all to be found in the science classes. In effect, they are 'areas of interest' schemes and many main classes contain a diversity of fundamental disciplines. It may be true that a hybrid of this kind is the most useful form of organisation in a general scheme, but even if it is, the distinction between fundamental disciplines and disciplines in a looser sense remains vital. Without it existing schemes cannot be properly understood and therefore cannot be used to optimum effect; without it subject analysis cannot be accurately carried out; without it no improvement on structure is possible.

When Colon Classification was conceived in 1925 the pressing problem that faced Ranganathan was that of specifying the complete range of compound subjects on which literature existed. In order to concentrate on this problem he was forced to ignore the more fundamental question of the forms of knowledge and his main classes consequently differ only in order from those of other schemes. In the circumstances this lack of originality is understandable and does not imply that Ranganathan was unaware of the distinction between disciplines and phenomena. In this definition, phenomena alone were merely 'isolates' (i.e. isolated elements) and subjects did not exist without the specification of some form of knowledge. In his teaching he recognised that the nature of knowledge was a necessary subject of study, both for effective analysis of documents and understanding of users' questions. He showed the way with his *Universe of Knowledge* course, taught first at Delhi in 1949. Bliss was complementary to Ranganathan in giving far more consideration to the philosophical aspect of Classification. Unfortunately, Comte was a major influence on his thought and the structure of the *Bibliographic Classification* suffers correspondingly, even though it is superior to that of any other scheme. Again for understandable practical reasons, the new edition of BC has retained the original structure almost intact. This does not

mean that philosophical considerations have been ignored, but it does mean that there has been no complete revaluation of structure to compare with Ranganathan's revaluation of detail.

The problem of distributed relatives is always discussed in terms of phenomena, but in a collection classified by DC, for example, 40% of philosophical works would be found outside the philosophy class and, almost certainly, a larger proportion of historical works outside the history class. The practice of chain indexing has alerted people to the need for showing the various locations of a particular phenomenon, but there is obviously no such awareness of the need to show distribution of a fundamental discipline. It is a more difficult task since the number of entries required may be formidably large; but if they aren't given, then many significant relationships are obscured. Neither BNB nor libraries classified by DC succeed in showing the ramifications of the fundamental discipline History. Such a failure suggests that the schemes themselves are wrong in their organisation. BC is alone in having seen the need for a comprehensive history class.

Fundamental disciplines are by far the most important formal characteristic of documents, but there appear to be six other categories, apart from physical features, with varying degrees of significance. The following table is indicative rather than comprehensive.

Form characteristics of documents

1 *Form of knowledge (Fundamental discipline)*: Philosophy, Science, History etc.

2 *Viewpoint*: (Religious) Christian etc. (Philosophical) Idealist etc. (Political) Marxist etc. (Scientific) Homeopathy, Behaviourist etc.

3 *Mode of writing*: Reference; Analysis; Description (reports, surveys, reviews, case studies); Interpretation (commentary, exegesis, hermeneutics); Criticism, evaluation; Prescription (codes, standards, recipes, specifications, practical manuals); Proposals; Forecasting, prediction, prophecy; Comparative studies.

4 *Genre*: Prose, essays, verse, plays, novels, humour, parody, imitation; adaptation: lectures, interviews, debates, conferences.

5 *Symbolic medium*: Mathematical (formulae, statistics); Pictorial (photos, drawings, plans, diagrams); Language

(English etc., translations).

6 *Structure of text* : Treatise, Monograph, thesis, dissertation; Composite work (anthologies, readings, miscellaneous essays); Programmed instruction, question and answer form; Reductions of original (outlines, digests, abridgements, abstracts, excerpts, quotations); Lists (classified, chronological, alphabetical); Indexes, concordances.

7 *Intended audience* : Introduction, primer, elementary, intermediate, advanced ; for children, school texts for various grades ; for particular groups of people.

In most schemes these characteristics are both deficient in number and badly organised. Colon made a great advance in organisation but has now been surpassed in detail by the new edition of BC. In all schemes formal characteristics, including a substantial part of some fundamental disciplines, occur mainly as common subdivisions. Some of them could have no other function; but others, as well as the fundamental disciplines, have greater significance. Ranganathan again showed awareness of this in making viewpoint the primary facet in certain main classes, the systems facet in medicine and psychology being examples. The fame of PMEST has tended to obscure the complete formula of Colon which allows for subdivision of main classes by other characteristics before their application.

These categories of formal characteristics should be as clearly understood and well organised as the categories of phenomena. It is essential to subject analysis for the recognition of all significant elements in a document and for avoiding confusion between different categories. A christian view of education is not the same thing as Education in Christian views. The former indicates viewpoint, the latter, subject of study but I have seen the two confused in practice. The presentation of knowledge in libraries and bibliographies must also take account of formal characteristics. In many classes outside science the materials are better organised if certain forms take precedence in citation order over the categories of phenomena.

In Economics, example, given the usual scope of this class, the primary division should separate theoretical, practical and historical writings. The normal practice of distributing economic history throughout the class is certainly unhelpful to

economic historians and not obviously an advantage to anyone. In the arts there is a clear distinction between theoretical and prescriptive writings on the one hand and on the other, writings that are descriptive of achievement in the art : history, biography, memoirs, and criticism. Since pure examples of the the last four categories differ from each other in substance and answer different questions, they are strong candidates for primary division of the descriptive section. At article level such separation is easy, but at book level we are impeded by the varying degrees to which works include both history or biography and criticism. The minimum requirement is that, where appropriate, these distinctions must be made wherever they occur in citation order. In practice it is common to overlook them if they do not form the primary facet.

Even the bibliographic characteristic composite work is more complex than usually thought. Such works are normally treated as being either miscellaneous collections or the equivalent of monographs on a specific theme. The comparatively small literature of jazz music shows this analysis to be inadequate. There are certainly some miscellaneous anthologies, but they can be distinguished from collected journalism, narrower in range and consisting mainly of concert, record and book reviews ; collections of critical essays on individual musicians; collections of biographical essays, and collected memoirs. If the last three types are limited in scope they are likely to be classified by topics such as period, place or style, ignoring their essential nature. Whatever principle of collocation is used a distinction should be made between a history of jazz in the 20s and a collection of critical essays on selected musicians active during that period; between a critical study of a particular band and the collected memoirs of musicians from the band; between a genuine history of jazz and the collected memoirs of musicians arranged in an historical sequence. Detailed examination of alternative orders achieved in this subject with collocation by theme or by form of writing shows that choice is not easy. Multiple entry is the only real solution, but while we have libraries and large bibliographies to arrange, choice of order remains a very important matter. To reach the best conclusion we must give due attention not only to phenomena, but also to the forms of writing and bibliographic considerations. The shade of Wyndham Hulme falls across the pages inspired by Bliss and Ranganathan.

2.10 Classification of Oriental Libraries with the Case Studies of Four Regions

(MRS.) S. NARASIMHAN

Presents a brief survey of development and the classification systems used in oriental libraries of 4 regions. These regions are—Chinese libraries, Japanese libraries, Korean libraries and Indian libraries. It appears from the survey that all the regions are using different classification schemes. To overcome the problems faced by the libraries of these regions, suggests formation of an internationally viable classification scheme. This new scheme is to be formed with help of international organisations like, IFLA, FID and Unesco.

1 INTRODUCTION

“The foundation of librarianship is classification. Without classification, no librarian can build up a systematic library”
—Sayers

The above quotation highlights the need for classification in any library. Dr Ranganathan defined library classification as the presentation of multi-dimensional thought in the linear form. The object of library classification is so to group books and other library materials that their subject contents can be related to each other in the most helpful order.

Centuries of accumulated experience indicated that the dominant approach of readers was to the subjects embodied in books.

In the days when the access to libraries was the prerogative of the few whose natural bent was towards scholarship, each was his own bibliographer and librarian. Books were fewer than the invention of printing in the fifteenth century it was the genesis of the problem which still remains unsolved, “how are the large and growing collection arranged”. This was the dilemma faced by all the libraries, oriental libraries being no exception.

Now coming to the nature of the oriental libraries, it can be stated in general that any library which houses the literature

on oriental studies may be termed as oriental. But the definition, scope and validity of the term 'oriental studies' is full of controversy. Webster's Dictionary defines the term oriental as "a member of one of the indigenous people of the Orient (as a Chinese, Indian or Japanese) constituting the biographic realm or region that includes Asia, South or South East of Himalayas and the Malay archipelago of West of Wallance's line." In common usage, when one refers to the Orient as the East, one seems to be using nothing more than a geographical term to distinguish the area from one another namely the Occidental or the West. But the same term acquires a different connotation when used in the historical context. In fact, some scholars argue that Orient is not just a geographic term meaning the East but is a cultural and ideational mode or style of approach, to a debate on orient supported by researched ideas and institutions, facts and experiences, etc. But this scholastic and academic meaning of orientalism does not stand by itself. It is also based on a readily accepted and widely believed fundamental distinction between the Orient and the Occident. In other words orientalism is a systematic intellectual discipline being developed in the west by which the occident would know, interpret and control the orient.

For the purpose of this article, the term oriental is synonymous with Asian and Far Eastern. It is used in the geographical sense to include Asia and the Eastern portion of Asia. At the same time, the study takes into account other connotations of the term "Oriental Studies" falling within the realm of comparative philology, historical linguistics, the study of comparative religion and also the discipline of anthropology.

A brief survey of development of libraries and the use of classification system in these libraries in the oriental countries would give some idea about the classification system followed their similarities and differences, their merits and demerits, and scope for improvement which would clearly highlight the essential characteristics of good classification that can fit in oriental libraries. But to study all the libraries in all the countries falling in the geographical purview of the term "Oriental" involves thorough research and detailed study running into several volumes. In this paper, a brief study of development of libraries and the classification schemes

followed in selected four regions is attempted. Apart from India, three countries covered are China, Japan and Korea, which in spite of major differences contain enough common elements to constitute a group distinct from other areas in the world.

They are presented in the following order:

- (i) Chinese libraries,
- (ii) Japanese libraries,
- (iii) Korean libraries, and
- (iv) Indian libraries.

2 CHINESE LIBRARIES

In the early days, Chinese libraries were not open to the public. The imperial collections were primarily used by emperor. A major library that of National Palace Museum in Peking was established in 1922 holding primarily the Ching Imperial collections. Between 1925 and 1926, the number of libraries have shown eight-fold increase from 502 to 4,041 but after two years of Sino-Japanese War the number of libraries have been reduced to 940.

In the first decade of People's Republic of China, considerable library development took place. In 1958, the total number of libraries was 321, 075 which had a total of 267 million volumes.

In the third century, the imperial libraries compiled a catalogue and placed all the works in four sections, classics, philosophy, history and belles letters. These four-fold systems dominated the Chinese classification and bibliographical work up to modern times.

Contacts with West made Chinese to create a new system of classification, the first of which is Dewey Decimal Classification with modifications by adding extra categories by using the 000-009 space, adding plus and minus signs and mixing symbols and numerals. Ding-U Doo, in 1925, was the first to suggest a universal system of classification that would deal with classical and modern, western and Chinese works.

Most of the modern Chinese systems have employed nine or ten main divisions and were decimal based. Alfred Kaiming Ch'iu, librarian emeritus, Harvard Yenching Institute, Harvard University devised a nine-fold system in which the

main categories are identified by four digit rules (except classics which has three). This system, it was claimed, was derived from the third century four-fold system and influenced by the Library of Congress system.

There are four major classification systems being used in Chinese libraries today. They are : the Chinese People's University Library System, the System for medium and small libraries Liu Kuo-chun's System and the Chinese Academy of Sciences System. The greatest problem involved in classifying the modern Chinese collections is generally centred on the legitimacy of the traditional system. Whether classics is a necessary and legitimate division is a subject of some controversy and universal conformity seems a long way off.

3 JAPANESE LIBRARIES

Japanese libraries rank as one of the major libraries of the world, both in terms of quantity and quality. It has not only a long tradition of poetry, novels and dramas but also has some genres such as diaries, travel accounts and essays on random thoughts.

Although the modern publishing in Japan's literary tradition dates back over 1200 years to earliest surviving Japanese book "Kojiki of 712 A.D.", it is however that Japan produced over a half-million titles before the advent of modern publishing. The Japanese literature can be broadly categorised into following periods :

- (i) Earliest Literature up to A.D. 794.
- (ii) Classical Literature—Heian period 794-1192.
- (iii) Medieval Literature—1192 to 1600.
- (iv) Literature of the Tokugawa Period—1600-1867.
- (v) Modern Literature—1868.

Today most libraries in Japan, process Japanese material with the *Nihon Jisshin Bunruiho* (Nippon Decimal Classification) or (NDC) and *Nihon Mokuroku Kisoku* (Nippon Cataloguing Rules) or (NCR). NDC was first proposed in 1928 by Kiyoshi Moyai and its first edition was published in the following year and the latest seventh edition in 1961.

According to Mori, NDC was developed by applying Dewey Decimal Principle to major classification categories used by

Cutter to accommodate mainly Japanese and Chinese material. A survey taken in 1964 by the Japanese Association shows that 584 out of 634 public libraries (92%) and 379 out of 481 college and university libraries (78%) were using NDC.

It may be added that the National Diet Library (NDL) in Tokyo which began its operation in 1948 with NDC for Japanese and Chinese and Dewey for Western language publications developed its own NDA classification and switched over to it in 1969. In principle, it is like LC classification; it uses one or two letters at the head with numbers 1 through 99 to cover subjects, reflecting its own holdings of the first fifteen years. On the other hand, a majority of Japanese collection on North America are using the LC classification for Japanese publications.

4 KOREAN LIBRARIES

The Korean literature had developed on two different levels. Native or folk literature for the lower class and a Hanmun literature in the Chinese language for the upper class. The history of Korean literature can be roughly divided into three periods. (i) period before the fourteenth century which was influenced by Confucianism and Buddhism, (ii) from fifteenth to the nineteenth century dominated by Confucian literature and the last period from the beginning of the twentieth century to date which was influenced by Japanese and western literature. Korean folk literature consists of songs, fiction, mask, plays and puppet shows, whereas Hanmun literature consists of poetry, fiction and literary essays, all in the old Chinese language.

The rulers were not only interested in establishing libraries but also enthusiastic in collecting books for the libraries.

The development of libraries in the early days had a set back due to war and change of rulers. After Second World War, however, many libraries began to be restored to normal. In 1957, there were 17 public libraries, 65 university and college libraries. Only 124 libraries in all existed in 1957 with a total of 3,000,000 volumes which increased to 390 libraries with a collection of 6,325,409 books in 1972.

Since China historically had developed the seven categories and four categories classification system, they must have been

known to Korean scholars and their historical catalogues and classifications were more or less based on the four categories classification system. A four categories classification version was used in *General Catalogue of the Kyujanggok Library* which was compiled by *So-Ho Su* in 1781. These four categories were further divided into 34 as a compromise between excessive simplicity and excessive details.

After the opening of Korea to the outside world, the classification of books began to change. The Korean books were classified into nine categories, *i.e.* (i) Enseignement, (ii) Language, (iii) Confucianism, (iv) Literature, (v) Morals and Customs, (vi) History and Geography, (vii) Dance and the Arts, (viii) Religion and (ix) International Relations. With introduction of western learning, the new western concepts were introduced into the classification system. When the new catalogue was prepared in 1954 by the Governor General Library, it was evident that they were influenced by Dewey Decimal Classification System. In 1934, when the books in Keijo Imperial University Library were classified, there also seems to have been used a combination of the LC system and the Dewey system. The Korean Decimal Classification Chart compiled by Prof. *Pak Pong Sik* in 1947 is truly the first Korean Classification Scheme done by a native. Even though it was completed with reference to the Governor General Library Classification Chart and the Dewey Decimal Classification Chart, the arrangement of the subjects and the sub-divisions are different from the former. The first digit number (0.9) are classes, the second digit numbers are subdivisions and the third digit numbers are sub-sub-divisions and the fourth digit numbers are for special fields or the sub-divisions. The defects of this classification are (a) lack of systematic arrangement of the class divisions and sub-divisions, and (b) lack of forms such as form geography and language. Thus it was inefficient in practical use. The Korean Library Associations compiled its own decimal classification chart in 1964 and it was revised and supplemented in 1966 and is in current use. This is a combination of Dewey Decimal Classification, the Japanese Decimal Classification (Nippon), the Universal Decimal Classification (UDC) and the Library of Congress (LC) Classification. This KDR will be adopted by the Korean Libraries more than any other classification system inspite of

its short-comings.

5 INDIAN LIBRARIES

Now coming to Indian libraries, it has a long history dating back to 3,000 B.C. The tradition of learning has been strong since ancient times, as is evident from a Vedic dictum that the transmission of knowledge is a charity par excellence. We know about the ancient university libraries of great repute at such places as Nalanda and Taxila. Royal and private libraries and those attached to the places of learning and religious centres abounded in medieval period. Akbar's reign (1556-1605) even saw the creation of a separate department for libraries to oversee the state and public libraries in the capital. He had zealously built a great library and had a large number of Sanskrit and other books translated into Persian, to equip it.

Later Maharaja Sarfoji II (1798-1833) was a great patron of learning and in his reign of 35 years, the Saraswati Mahal Library at Tanjore grew enormously in size and content. The Library of the Madras Library Society established in 1878, is the oldest in India having had a continuous record of service for one and a half centuries. Madras Oriental Manuscript Library with its inception in 1869 ranks next in importance to Saraswati Mahal Library. Among other libraries, that developed in the late 19th century and the early 20th century, the most important are the Connemara Public Library, Madras, Adayar Library, Madras, National Library, Calcutta and Delhi Public Library. In addition, the universities and colleges of the schools and public institutions have libraries attached to them, varying in their contents and size, according to their needs and available financial resources. Today there are more than 57,000 libraries of all descriptions in the country including ten libraries attached to the institutions declared by Parliament as of national importance. In addition to these, various libraries in national laboratories, government departmental libraries and other libraries which are directly under the control of the State and Central Government run into more than 5,000 in number.

Also the manuscripts in India have a long tradition. They were produced in all parts of the country in many languages and scripts on a wide range of religious, philosophical, historical, literary and scientific subjects. These manuscripts are

scattered all over the country in (i) university libraries, (ii) places, (iii) *granthpura* collections, (iv) pathshalas, (v) madrasas, (vi) museums, (vii) temples and also in princely collections. Prof Raghavan an expert in oriental learning has compiled a directory of centres of oriental studies in India which lists 363 institutions from all over the country devoted to promote the cause of indology.

In India there are no records of various classification schemes used in the libraries during the 18th and 19th centuries. The little information which was available indicates that there was no specific standard schemes adopted by these libraries but had compiled some subject catalogues and author catalogues according to their needs from time to time.

In the early 20th century, Dr Ranganathan made an effort to classify the Madras University Library by Colon Classification, soon after its conception in 1924 being the author of this scheme. Later when the scheme was further developed, he himself reclassified the one lakh books of the Banaras Hindu University in 1947. As variety of independent schemes, all useful in their particular setting have been designed by a number of authorities like Dewey, Ranganathan, Sayers, Jevon, Mann, Richardson, Cutter and Brown, different libraries in India use different schemes, the most popular being Dewey Decimal Classification. This scheme has undoubtedly revolutionised the ideas of librarians but it was devised to suit libraries and their collections in USA. It is not suitable for classifying the enormous resources of oriental literature possessed by so many Indian libraries. In spite of these shortcomings, the librarians in India have been blindly classifying mostly according Dewey, except for a few specialised libraries which are classified either by UDC or Colon and causing considerable inconvenience and wasting enormous resources. The librarians were reluctant to follow the Colon Classification because of its complexity. Contrary to their beliefs, this scheme is analytico-synthetic with a broad base to incorporate each and every field of knowledge. It is flexible, expandible, adjustable and hospitable, and the notation is economic. In fact, it is the best scheme suitable for classification of books where books in Indian languages, literature, philosophy and religion are in abundance.

6 CONCLUSION

These survey of libraries in the four regions clearly indicate the wide differences in the use of classification schemes not only between the countries but also between the libraries within the regions. Since the approach of the reader is also always by subject, there was need for subject headings in natural language in the alphabetical part to direct the reader to his area of interest in the classified part of the catalogue. The chain procedure devised by Dr. Ranganathan is a mechanical one to derive subject headings from the artificial language of classification to the natural language. It has gained a world-wide popularity in the field of document retrieval. Using this technique of chain procedure and devising a scheme which is analytico-synthetic, co-extensive, hospitable self-perpetuating, economic and which provides for various devices like chronological, geographical, alphabetical, super imposition, classic, space and time. An internationally viable scheme could be propounded and universally adopted by the libraries of the world and specially by those situated in the oriented regions. Library classification is a international language. Again, the more scattered the experts in the specialised regions of the field of knowledge, the greater the need for an international basis for the organisation for the maintenance of the library classification. Such an organisation is best formed as part of IFLA, (Internation Federational of Library Associations. The Hague, Netherland) and FID (International Federation for Documentation) since classification and cataloguing are inseperable. The organisation must look after classification and rules of catalogue which prescribe subject headings. If the IFLA and FID amalgamate and if the UNESCO utilises the professional knowledge thus pooled and provides the necessary finance through its departmental libraries; it is possible to get the stablest organisation for the maintenance of library classifications as an international language of ordinal numbers self-prepetuating in a large measures and meeting with every success in facing the continued challege of the field of knowledge.

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2.11 The Contribution of S.R. Ranganathan in The Classification and Cataloguing of Ancient Sanskrit Classics

M. PARAMESWARAN

Abbreviations Used

(AACR)	Anglo-American Cataloguing
(AD)	Alphabetical Device
(CD)	Chronological Device
(CIE)	Class Index Entries
(CN)	Class Number
(CID)	Classic Device
(CCC)	Classified Catalogue Code
(CC)	Colon Classification
(DDC)	Dewey Decimal Classification
(FCD)	Favoured Category Device
(MC)	Main Class

The term classic is defined. Ranganathan's classic Device is explained. The purpose and the advantage of Classic Device are examined. The methodology of classic Device in the notational plane is explained with illustrative examples. The classic Part (Pt 3) of colon classification is also examined. The inadequacy of (DDC) Numbers in classifying the Classic is reviewed and Classic Device is recommended for (DDC) and other schemes of classification also.

1 INTRODUCTION

The word classic is defined as a work of the first rank and of generally acknowledged excellence.¹ Classic is a work usually having embodiments in several versions, adaptations and translations and stimulating other works on itself and getting copied out and/or brought out in print even long after its origin. For example Aristotle's Poetics, Newton's Principia and Marx's Capital are classics.^{2,4}

The inherent qualities of a classic stimulating other auxiliary literature such as commentaries and criticisms according to Dr. S.R. Ranganathan are as follows :

- (i) It has elements of permanent value.

- (ii) It is saturated with the personality of the author.
- (iii) It is a seminal work cutting new ground, blazing new trial, stimulating new thought and so on.³⁴

Here Ranganathan has tried to define the classic and to identify its inherent qualities from a classifiers point of view.

The basic sacred book of a religion have the qualities described above. Any scheme of classification generally makes each sacred book a class by itself. But classics are not peculiar to the Main Class (MC) Religion and Literature. Any other (MC) may have classics of their own. Linguistics of different languages have their own classics. (MC)s like Politics and Law have their own classics. Ranganathan's Five Laws of Library Science and Prolegomena to Library classification have qualities of classics. According to Ranganathan an author, one at least of whose works is a classic, is a classical author. According to him a classic is to be treated as a subject by itself. It should be made a quasi class i.e. in classification it should be represented by a unique Class Number (CN) and in subject cataloguing the title of the classic should be made a subject Heading. A commentary of the classic is an accompanying work which explains it and carries the subject forward. Therefore the commentary should also be deemed to be a quasi class.

2 CLASSIC DEVICE

21 *The Purpose*

In *Colon Classification* (CC), Ranganathan had used a special device Called Classic Device (CID). The (CID) is employed for

1. Bringing together the

- (i) Different editions of a classic in a subject
- (ii) Different editions of each of its commentaries
- (iii) Different editions of each of the sub-commentaries of each of its commentaries and so on : and

2 Securing that the

- (i) Group of subcommentaries of a commentary is in justa-position to the commentary,
- (ii) Group of commentaries of a classic is in justa-position to the classic, and

- (iii) Group formed of each classic and its cluster of commentaries is in justa-position to the cluster of the other classics in the same subject.⁴

22 The Method

In the notational plane, the (CID) consists in adding successively after the number representing the ultimate class to which the classic should be otherwise assigned

- (a) The Digit X
- (b) The Author Facet, and
- (c) The Work Facet

Provided the classic is not a sacred work or a work going with the (MC) Literature, as these are individualised otherwise.

The following are the rules for constructing the Isolate Number for the Author Facet, the Work Facet and the Commentary Facets :

1 The Author and Work Facet are deemed to be Personality Facets at successive levels.

2 The connecting digit comma need not be inserted before the Author Number.

3 The Author Number may be determined by the Favoured Category Device (FCD) for not more than sixteen classical authors and for the others by the Chronological Device (CD) in the same way as the Author Number in the subjects going with the Basic Subject Literature.

4 The Work Number may be determined by Alphabetical Device (AD).

5 A Commentary Facet may be added to the Work Facet. The Isolate Number in it may be determined by the (FCD) for not more than sixteen commentaries and by the (CD) for the others, or as an alternative it may be determined by (AD).

6 Second Remove Commentary Facet, Third Remove Commentary Facet etc may be added successively after the First Remove Commentary Facet. The Isolate Number in them may be determined as in the First Remove Commentary Facet.

7 All the Commentary Facets are deemed to be Personality Facets of successive levels after the Work Facet.⁴

Examples of (CC) Number for Sankara's Brahmasutra bhashya and its commentaries constructed according to the above rules on next page.

R66, 5×1, 1	=Sankara, Brahmasutra bhashya
R66, 5×1, 1, P	=Padma Pada : Panca padika
R66, 5×1, 1, P, P	=Prakasatman : Panca padika vivarana
R66, 5×1, 1, R	=Ramananda Saravati : Ratnaprabha
R66, 5×1, 1, R, R	=Acyuta Krsnananda : Ratnaprabha Vyakhya.

If we use Dewey Decimal Classification (DDC) to classify the above classics all the works will get only the same (CN) *i.e.* 181.482=Advaita Philosophy.

23 The Classics and the Collected Works

The digit used to indicate a classic is X *i.e.* the digit to indicate the Anteriorising Common Isolate (ACI) collected works. Normally collected works are published only in the case of authors of classical status. In that case, the sequence will be collected works first and then each classic in succession along with its cluster of commentaries.⁴

24 The Advantage of Classic Device

What has been achieved by (CID) is that each classic is made a quasi class. That is each classic is treated as if it is a subject by itself and is represented by a unique class number. So all documents relating to a particular classic, *i.e.* various editions, commentaries, subcommentaries etc. are brought together in justa-position. All classics in a particular (MC) are brought together in justa-position. Thus classics are separated from ordinary text books in any (MC) and these are placed at the beginning of the subject in shelf arrangement. This kind of arrangement has a definite advantage in satisfying the readers approach, because these are fundamental and significant contributions in any subject. For example a person who wants to study Advaita can do it only by a thorough study of Sankara's works. Since all the commentaries of each of the works of Sankara will follow the work, the commentaries can be easily located which will facilitate the study. This is the unique advantage in using (CC) for shelf arrangement.

3 CLASSIC SCHEDULE IN COLON CLASSIFICATION

The third part of Colon Classification contains a detailed schedule of many of the classics. Most of these are works written in Sanskrit language. But it also includes classics of Tamil and other Dravidian languages. This part consists of the schedules of classics belonging to the following (MC)s :

L	Medicine Spiritual Experience and Mysticism
N	Fine Arts
O	Literature
P	Linguistics
Q	Religion
R	Philosophy

The list of classics enumerated in this part is not completed. This is to be treated as illustrative examples only. Individual libraries should make necessary additions in the schedules of classics when required. Careful judgement is required in treating a book as classic. Opinions of subjects experts and explicit statements in the preface etc. may be of help in judging a book as classic. The (MC) L consists of classics of LB Ayurveda only. Spiritual Experience and Mysticism consist of Hindu, Jain, Buddhist and Sufi Works. (MC) N Fine Arts lists only a few classics. Actually there are much more classics in Architecture, Sculpture, Music and Dance. These classics should be identified and added to this list. (MC) O Literature starts with some critical studies on Shakespeare and the Greek classic Aristotle's Poetics. But the main bulk of the schedule in (MC) Literature is on Sanskrit Literary Criticism (Alankara Sastra). A detailed list of Tamil literary works of Sangam period is also given. This is followed by a few classics of Kannada and Telugu Poetics and Prosody. (MC) P Linguistics includes a fairly exhaustive list of ancient Sanskrit classics. (MC) Q gives a list of important sacred works of different religions. The Upanishads and other sacred works of Hinduism are so many in number. Therefore exhaustive enumeration is not possible. But the illustrative examples give us a methodology for constructing class numbers of similar sacred works. (MC) Religion is followed by the schedule of Classics in the Canonical Class R 6 Indian Philosophy. The classics of various branches of Indian Philosophy are listed here. This includes Hindu, Jain and Buddhist Philosophy. It may be possible to identify the classics in Greek Philosophy and list them under the Canonical Basic Class R7.

4 CHAIN INDEXING OF CLASSICS

Chain indexing is a helpful methodology for deriving Class Index Entries (CID) or subject index entries in a catalogue.

Ranganathan has given a detailed account of chain indexing in his Classified Catalogue Code (CCC). Specific rule is given in CCC for deriving (CIE) from a Class Number (CN) of a quasi class representing a Classic, a Sacred Work, a Literary Work or a Commentary on any of these. As per this rule, when the same digit in a (CN) represents the work and its author the following two (CIE) are to be derived from the (CN) corresponding to that digit :

1 Title of the Work as Main Heading and the name of the Author as Sub-heading.

2 The name of the Author as Main Heading and the Title of the Work as Sub-heading.²

For example let us take the following (CN) as an illustrative example.

R66, 5 1, P, P = Prakasatman · Panca Padika Vivarana

This (CN) will give the following chain :

R	= Philosophy
R6	= Indian Philosophy (sought Link)
R61	= Hindu Philosophy—(link at telescoping point)
R65	= Vedanta—(link at telescoping point) (sought link)
R66	= Advaita (sought link)
R66,	= (false link)
R66, 5	Brahma-sutra (sought link)
R66, 5	= Commentary on Brahma sutra (unsought link)
R66, 5 \ 1	= (false link)
R66, 5 ∨ 1, 1	= Sankara : Brahma Sutra bha hya
R66, 5 1, 1,	= (false link)
R66, 5 1, 1, P	= Padma-pada · Panca—Padika (sought link)
R66, 5 1, 1, P	= False Link
R66, 5 1, 1, P	= Prakasatman : Panca—padika vivarana (sought link).

The (CIE) with following subject headings are derived from the last link of the above chain.

- (1) Panca Padika Vivarana, Prakasathan
- (2) Prakasathan, Panca Padika Vivarana.

Corresponding to the immediately preceding link of the last link also we can derive two (CIE) s in this manner by permutation of the names of the author and the work, as shown below ·

Panca Padika, Padma Pada
Padma Pada, Panca Padika

(CIE)s will be prepared for other sought links one by one in the reverse order of the chain by translating the meaning of the last digit into verbal plane. Then we shall get a number of (CIE)s with subject headings similar to those given in the above chain on the right side of the equal to sign.

If we classify and catalogue the above work *Panca padika vivarana* we are able to satisfy all the approaches of the readers by a number of simple (CIE). But if we use Anglo American Cataloguing Rules (AACR) to catalogue this work the same result can be obtained either by a number of complicated analytical entries or author-title added entries. Thus the economy achieved by Chain Indexing in the cataloguing of classics is remarkable.

5 APPLICATION OF CLASSIC DEVICE TO OTHER SCHEMES OF CLASSIFICATION

However, it is possible to apply (CID) to the (CN) of other classification schemes also. For example the ultimate (CN) representing any work on Advaita philosophy in (DDC) is 181.482. From this Number we can derive unique class number for any classic in Advaita philosophy. Some examples are shown below :

181.481 ×	= Classics in Advaita
181.481 × i	= Sankara in Advaita
181.481 1, V	= Sankara, Upadesa sabasri
181.481 > 1, V	= Sankara, Viveka Chudamani
181.481B	= Brahmasutra discussed according to Advaita Philosophy
181.481B ×	= Commentaries on Brahmasutra according to Advaita Philosophy
181.481B × 1	= Sankara on Brahma sutra
181.481B × 1, B	= Sankara : Brahma sutra bhashya
181.481B × 1, B, P	= Padmapada : Panca padika
181.411B × 1, B, P, P	= Prakastman : Panca Padika vivarana.

The example given above illustrates that (CID) is applicable with classification schemes other than (CC) also.

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Ch TA and TB.

2.12 Development of Classification Terminology: Contribution of Professor S.R. Ranganathan

K.N. PRASAD

This paper analyses the developments of terminology of library classification in India. It was Professor Ranganathan who provided the framework and input to terminology development. Ranganathan developed a set of terminology to communicate his creative ideas for analytico-synthetic classification. Many of these terms have become common terms occurring in any text-books, treatises, papers etc. in library classification. After grouping the terms on the basis of normative, operative and associative nature, the paper presents developments of Ranganathan's terminology as presented in his prolegomena to library classification. The paper focusses on the interdisciplinary nature of the terms in library classification. The terminology reflects it. It presents in a nutshell the strategic approach of Ranganathan in communicating ideas in a fast developing field.

1 INTRODUCTION

One of the principal contributions of Professor Ranganathan to library classification, besides his intuitive and intellectual contributions, is the terminology for expression of ideas. It is fascinating to analyse this contribution of Ranganathan. This paper presents a study of the development of classification terminology and its impact on the development of the subject.

The development of terminology of library classification in India came along with the development of the theory and practice of classification. It has grown at a faster pace during the last 20 years. This is due to intensive development research taking place in the field of library classification.

The first consolidated version of the glossary of terms in library classification was published in the journal "Annals of Library Science" in 1958. It was later scrutinised, updated and standardized, and published in the form of a Standard as Glossary of Classification Terms (IS 2550 : 1963). Since then, there has been a continuous tracking for updating the "Glossary", as the development in classification in India and

in international circles is also growing at a fairly lively pace.

11 Nature of Terms

The multidisciplinary approach to classification research has brought in a hoard of terms which are at once expanding the horizon of the field of classification. The new edition of the Glossary, should have an audience which belong to different disciplines.

The analytical features of the terminology in the revised version of the 'Glossary' can be identified into three broad groups on the epistemological nature of the terms as normative terms, fundamental terms and associative terms.

The normative terms are those terms which provide a directive to the operation in the field of classification. They prescribe the procedure and identify the expected quality of the operations that would result from such prescriptions. Ex : Canon of Differentiation.

The fundamental terms are those terms which define the basic concepts which are germane to the very nature classification process. Ex : Division, Characteristics.

The associative terms are those terms which extend the meaning of the fundamental terms into different contextual levels for discussion and operation in classification research. Ex : Open ended array.

The following table presents a census of terms taken from the Prolegomena and grouped according to their nature :

<i>Sl No</i>	<i>Nature of the Term</i>	<i>No. of Terms</i>	<i>%to the total no. of terms</i>
1	Normative terms	112	21.8
2	Fundamental terms	110	21.4
3	Associative terms	292	56.8

Annotation The above analysis clearly shows the largeness of associative terms over other types of terms. Since they are of operational nature, communication demands more number of them for explicit presentation of the subject. The fundamental terms are input terms and the normative terms provide procedural hints. The latter are relatively small in number and higher in occurrence of order of usage.

12 Plane-wise Grouping

The operational nature of classificatory science has been mentally separated into three planes of work. The decision paramountcy in this operation is given to the idea plane. The verbal plane provides the communication media. The notational plane concerns itself with the ordinalization of the ranking of the decisions made in the idea plane. The terminologies developed in the field of classification theory and practice reflect the quantum of operations involved in these planes.

The following table presents a census of distribution of terms in the three planes of work :

<i>Sl No</i>	<i>Name of plane</i>	<i>No of Terms</i>	<i>%to the total no of terms</i>
1	Idea plane	298	58.0
2	Verbal plane	35	6.8
3	Notational plane	181	35.2

Annotation. As may be seen from the table, the Idea plane contribute 58% of the total number of terms. The terms in the idea plane are the outcome of thinking process. Every activity or action has to be preceded by an idea and therefore they are more in number. The terms for work in the verbal plane transmit or convey the work to the notational plane. The work in the notational plane has a parallel amount of work in the idea plane, but may be of less frequent usage. The number of terms in each of the three planes indicates the importance of each plane of work.

13 Edition-wise Grouping

The contributing factors to the terminology development in classification in India, centre round the seven editions of the Colon Classification and the three editions of the Prolegomena to Library Classification. They provide a solid framework and input to the glossary of terms. They also indicate the time landmark in the progress of the development of classification theory.

The following table presents a census of the edition wise distribution of the terms. It also indicates the obsolescences of the terms and re-use of the terms in the three editions.

Edition	New	No. of Terms		Continued	% of terms to the total	Remarks
		Deleted	Reintroduced			
1(1937)	183			Ed 1 to 2 58	35.6	includes 12 terms which
2(1957)	145	52		Ed 1 to 3 95*	28.2	were deleted from Ed 2
3(1967)	186	152	14	Ed 2 to 3 77	36.2	but re-incorporated in Ed 3

Annotation There are in all 514 technical terms used in the three editions of the Prolegomena. The use of terms in the three editions is significantly almost uniform except that in the second edition, there is a slightly smaller number of terms used. The trend of discontinuing the use of terms used in earlier editions is also clearly seen. While 52 terms used in the first edition were deleted in the second and a total of 122 terms used were deleted in the third edition. This indicates that Ranganathan was very conscious of using the right terms for the right concept and in thoroughly examining the usefulness of terms.

2. INTERNATIONAL USAGE

The spread of jargons in classification to an international circle can be said to be fostered by the CRG in London. The CRG members had very close contact with Ranganathan and critically analysed each term which he had used in his various speeches and writings. They refashioned some of the terms and retained many of them as such and provided explanatory notes to the definitions, spread them to library schools in Britain and other countries. Textbooks began to appear using many of the concepts which Ranganathan had propounded.

The first international study conference held at Dorking, principally supported by CRG, saw to it that a comprehensive glossary of terms developed for use at the international level. The glossary was compiled by B.C. Vickery for the benefit of the new audience. This movement was very well complimented by the FID Congress, and FID/CA Committee in which Ranganathan himself was very much involved in the propagation of ideas. The growth of terms in the second, third, and

fourth study conferences indicated a steady improvement in the classification research.

Today we can find that contribution of Ranganathan to the classification terminology is almost an integral part of any classification research, teaching, learning or writing.

3 RELATION TO OTHER TERMINOLOGIES IN LIBRARY SCIENCE

Classification is a vital discipline in the field of library and information Science. It pervades all sections of library science. Thus the terminology of library classification is an interactive terminology. It spreads into several sub-disciplines. The closest among the other disciplines with classification is cataloguing. The symbiotic nature of classification and cataloguing has taken a common link in relation to subject indexing terms. Many of the verbal plane rules of classificatory terminology can also act as rules for cataloguing terminology.

In relation to reference service, classification provides the analytic and synthetic framework for efficient handling of reference work and service. Much of the classification terms can be used in more or less same fashion in the jargon of reference and information work. A kind of idea selection is symbiotic with that of reference and information work.

Among other disciplines, the management aspect of libraries comes close to the terms in classification. However, their affinity cannot be very significant.

Thus, library science discipline can claim terminology of classification as crucial to its own development. The intellectual framework of library science lies in classification terminology.

4 MODEL DEVELOPMENT

From the foregoing discussions, it may be evident that the classificatory terminology indicates a novelty in the development of a subject field. Classification science which has grown from a skill to a technique, to an occupation, and to a profession, demonstrates that the creative opportunities in the field of learning automatically calls for creation of effective jargons. Such jargons would effect a high order of economy in communication. Thus, the developments in a new field essentially hinge around the creation of terminology.

The phenomenon can be seen in several new fields such as,

General Systems Theory, Operations Research, Computer Science, Tribology, and Ergonomics. Infact, the science of glossematics itself is an excellent demonstration of the model of the growth of terminology in a neo-discipline. An algorithm for the pattern of terminology can be developed on the basis of growth in these fields. It may be said that terminology emanates when it is pressurised by a highly creative activity in a new field. It calls for a sudden change in terms and later, refinement into acceptable terms by dissemination and constant use.

The terminological studies in the field of library classification has found that the field has a resilience in relation to the growth of new ideas as well as in finding new terms or new meanings for old terms. The term-concept relationship indicates that the rate of growth new terms is becoming increasingly refined. It is tending towards evolution of a polished language of classification. It would be purely a technical language.

5 INTERDISCIPLINARY INTERACTION

The field of terminology is a distillation of several semioticological disciplines, such as, linguistics, logic, epistemology, general semantics, cybernetics, and general systems theory.

The linguistics provides the grammar and principles for formation of words. Logic provides the rigour of reasoning and the process of induction and deduction in appropriate proportions. The term concept relationship and the etymological factors in the emergence of terms are the inputs from epistemology. The modulation of variations of the meaning of terms forms the input from general semantics. Resetting of terms and measuring the communication potential of terms in a discipling forms the input of cybernetics—a kind of feedback mechanism. The general systems theory provides the philosophical framework for the terminology as a discipline. It acts as a kind of interactive binder between the inputs provided by other disciplines. We find that with the concept of terms as a cluster the systems theory brings a kind of homeostatic relation between the input of disciplines in the section.

The collective disciplinary action of all this distillation in the form of terminology studies is applied to the field of library classification as an interplay subject. The field of classification itself is again a kind of interdisciplinary subject. It is the result distillation of several interacting subjects such as, logic,

epistemology, psychology, psycho-linguistics, education, economics, and general systems theory.

Logic is the home of classification. Marking and demarking of fields of knowledge and identifying the modes of recombination of the subject is its focus in the field of knowledge. Epistemology brings in an interplay of the existing structure of knowledge with the newly emerging structure of knowledge. It brings in a kind of harmony in the study of the growing field of classification. Psychology brings into focus the developmental processes in the recognition of ideas and idea clusterings in relation to enumeration of subjects. The psycho linguistics emphasises the interlinking process involving the organization of knowledge and the language processing ability of the human mind. Promoting meaningful transactions between the growth of knowledge and the development of human personality is the focus of education. The field of classification gets input in the form of specialized thinking due to education in any field of knowledge. It is the educational consensus that helps us to recognize a field of knowledge as a fully developed one. It is from education that we derive the principles of ordering ideas in a discipline.

The change in cultural framework of a civilization indicates the changing framework of knowledge. The cultural dynamics and the resulting structure of knowledge provide the inputs for determining the scope of discipline for the purpose of development of schedules of classification.

Maximized utilization of intellectual power of human knowledge is the corner-stone of developing economy. It is economics which determines the need for specialized skills and at the same time generates approach as to the managerial and coordinating skills. Thus economics provides a policy and direction for the organization of knowledge.

The general systems theory inducts balance force in the mutual inter-action among these interdisciplinary subjects and thus focuses derivation towards the library classification.

Thus we find in the present investigations, there are overlapping interdisciplinary approaches, for terminology studies as well as library classification studies. And this overlap itself provides the thematic interlink for studying the mutual influences between these two distilled subjects.

6 THEORETICAL DEVELOPMENT IN CLASSIFICATION

The past one century of classification research has shown that library classification is amenable for scientific method. It is governed by a set of laws, postulates, canons and principles.

One can see an organized pattern in the design of classification. Theoretical developments in classification have been succinctly worked out by Ranganathan into three planes of work, viz., Idea plane, Verbal Plane and Notational Plane.

The idea plane generates a pure formal structure of knowledge from the point of view of its use. The information seeking behaviour of users have a purpose-oriented approach on such an organization. Classification harmonizes the user and knowledge towards a productive relationship for social benefit.

The varying use of knowledge influenced by the demands of the society brings in the need for faster pace of change in the design of classification system. Such influence keep the theory of classification ever dynamic and ever challenging. We have seen in the past two decades, global variations in telecommunication technology influencing basic assumptions in the theory of classification.

The aim of the idea plane seems to tend towards generating a simple and yet versatile system of classification. The verbal plane covers operations in relation to terminologies in various fields of knowledge. It is involved in modulating and standardizing terms for better communication among specialists. Ranganathan has developed his own set of principles for terminology for the development of classification. The notational plane provides the mechanisms for regulating knowledge for repetitive operations in libraries and documentation centres. Attempts to develop fully hierarchic structure for knowledge led into several varieties of complexities. The analytico-synthetic features of notational systems have provided fullest capacity for accommodating new ideas with greater facility and ease. Newer kinds of devices in the notational plane have been one of the important issues in classification research.

The scientific development of classification essentially depends upon the clarity of concept that is developed so far. They provide the basic foundation for a fully versatile dynamic theory of classification. Communication of these concepts in teaching and research essentially depends on the rigour of

terminologies in the discipline of classification. It has to be kept ever current in order to be best utilized by the user generation.

7 COMPLEMENTARY FEATURES IN VOCABULARY CONTROL DEVICES

The information retrieval process today depends on several complementary devices which are concerned with retrieval concepts by terms and other suffragates. A theory of information representation covering all these is considered to be an important development in the fields of information science. However, there seems to be an urgent demand for amalgamation for different kinds of vocabulary devices. These can be as follows :

- (i) a systematic dictionary;
- (ii) an inter-mission retrieval thesaurus;
- (iii) a classification schedule;
- (iv) an assembled index;
- (v) a command language for searching a data base; and
- (vi) codes for assembling and reassembling the concepts in the form of natural language texts.

These are some of the current devices being operated in information retrieval systems.

Such complementary devices emerge from a single operation at a seminal level called analytico-synthetic approach. Such an approach provides a facile tool for analysing, integrating and reintegrating subjects, phrases, ideas and elemental concepts.

8 SUMMARY OF FINDINGS

We may state that Ranganathan had a systematic approach to the development of the subject of classification. He developed a set of terms to express the concepts and imbibed a precision to science of classification for information control. A desideratum can be drawn from Ranganathan's approach. It may be stated in the following terms :

1 There is an evolution of a new discipline called 'Terminology Studies'. It is the result of enormous growth of ideas in specialized fields of universe of knowledge necessitated by the demands for faster communication among specialists.

2 Terminological study as a discipline exhibits a tendency to

become a science, in particular a formal science. It exhibits the development in the form of laws, postulates and canons. It has the potential of offering, at a formal mode, applied mode, and developmental mode of research. It is a fertile field for interdisciplinary research calling for team efforts from systems analysis linguists, locicians, epistemologists, psychologists and educationists.

3 Library classification has developed from a craft to an exceedingly exacting field of science, like mathematics. It has exhibited all the features of a fully developed discipline indicating challenges for highest level of intellect in the human endeavour.

4 Library classification has interdependent support in the form of schools of library science, professional associations, research institutions, application centres periodical publications, books, research reports, review articles, and trend reports.

5 The terminology development has paralleled the conceptual development in the field of library classification. Simultaneous development of functional concepts as well as terms for them have facilitated faster development of the field of classification.

6 The interdisciplinary nature of research in library classification has led to a new field of knowledge known as "Taxology" or "Ordering System for Knowledge". A team of specialists involving systems analysts, logicians, psychologists, sociologists, educationists and computer scientists have all 'come' closer to participate in meeting the challenges posed in the field of library classification.

7 There is an interactive interdependent development between terminology studies and classification studies—a kind of complementary system in the development of knowledge. The growth in terminology will contribute to growth in the development of classification theory and vice-versa.

Succinctly stated the principle finding of this paper would be to present the highly interactive and interdependent nature of the two formalized disciplines of terminology and classification. In a nutshell, it presents the harmonization of two highly evolved fields of knowledge. What is presented in this paper is not a final finding but a record of a movement towards clearer insight into intellectual reference frameworks for a better communication among specialists and generalists. It is hoped that such developments in the universe of knowledge is a true

contribution towards the motto of "KNOWLEDGE FOR USE"—a paraphrase of Ranganathan's first law of library science.

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- 9 —, *Library Classification, Fundamentals and Procedure* 1944.
- 10 —, *Prolegomena to Library Classification*, Ed 1, 1937; Ed 2, 1957; Ed 3 Assist by MA Gopinath, 1967.
- 11 All the Relevant Articles in the Following Periodical Publications :
 - (1) *Annals of Library Science and Documentation*
 - (2) *Library Science with a Slant to Documentation*
 - (3) *DRTC Annual, Mid-term and Special Seminars.*

2.13 Design and Development of Depth Version of Colon Classification for Food Technology

S.V. SANGAMESWARAN and M.V. GOPINATH

Ranganathan has been often called a multifaceted genius in the area of Library and Information Science. This is obviously because, his contributions range over the entire range of subjects in library science, be it, classification, cataloguing, reference service, book selection, library legislation and so on. In classification, his genius could well be recognised by the fact that a mecano set triggered off the idea of "facet" which was named so later. These facets further gave way to the recognition of fundamental categories and what is termed a facet formula. Though colon was first used to show relationships between facets, other relation signs were developed. Another significant aspect is the recognition of three planes of work, namely, idea plane, verbal plane and notational plane. The concepts and ideas that flowed, the excellent terminology he developed, and a notation which is perhaps the most flexible known that emerged really revolutionised the classification field in that it could be applied to documents of any depth. This was made possible by slowly removing the rigidity in the facet formula to give way for a really freely faceted classification.

CFTRI Library recognised the potential of this system quite early and from inception has been using colon classification. When it introduced documentation, it found the existing scheme as inadequate and developed a depth schedule in food technology in close collaboration with DRTC, Bangalore in 1966, with which Ranganathan was associated during his last years. Our paper has made an effort to trace this development in detail as also our experience in using it.

1 INTRODUCTION

Ranganathan can be described as a multifaceted genius in that his contributions significantly encompass the entire range of subjects, classification, cataloguing, reference service, book selection, library legislation and so on. With the dawn of documentation, he also turned his attention in this area and achieved world eminence. His most fundamental contribution was Colon Classification in 1925 (CC), the idea having been triggered by seeing a mechano set in a London shop. Instead

of listing class numbers as enumerative scheme such as D.C., he visualised analysing a subject into aspects, which he later called facets, and combining them by a colon. The idea of facets led to the famous fundamental categories, personality matter, energy, space and time. With successive editions C.C., he developed a theory of classification which has been published as *Prolegomena to library classification*. It was Ranganathan's habit to experiment whenever opportunity arose and thus emerged concepts that revolutionised classification. Some of such concepts include the recognition of three planes of work (idea plane, verbal plane and notational plane, focus and facet, postulates, compound isolate and special component, mixed notation, to name only a few. He also identified two types of isolates, namely, special isolate (special to a basic subject) and common isolate. The latter variety includes geographic, language and common isolates (anteriorising and posteriorising), besides certain common property and energy isolates applicable to all subjects. The most attractive feature of CC is its notation system which is perhaps the most flexible one and whose versatility is due to its following qualities :¹

1 Its mixed nature.

2 Its provision of empty digits.

3 Its admitting of as many as 1,166 places in an array with no number having more than three digits of which one and only one is semantically rich.

4 Use of mixed notation to provide for several sectors in an array and for extrapolation at the end of an array.

5 Its sectors in an array allowing of telescoping of schedules.

6 Its emptying and empty-emptying digits admitting of intrapolation at any point in any array.

7 Its indicator digits and decimal fraction notation admitting of intrapolation and extrapolation.

8 The mnemonic use of digits—seminal, schedule and systematic mnemonics.

The above features and others pertaining to colon classification has been discussed in detail elsewhere.¹ Suffice it to say here that Ranganathan developed a methodology for generating depth schedules in 1961² and many schemes for microsubjects have since then developed. The CFTRI library in collaboration with DRTC developed a Depth Schedule for Food Technology³

and this paper is concerned with the design, development and subsequent use of the same. It is gratifying the authors had the benefit of Ranganathan's advice on several occasions during the developmental stage.

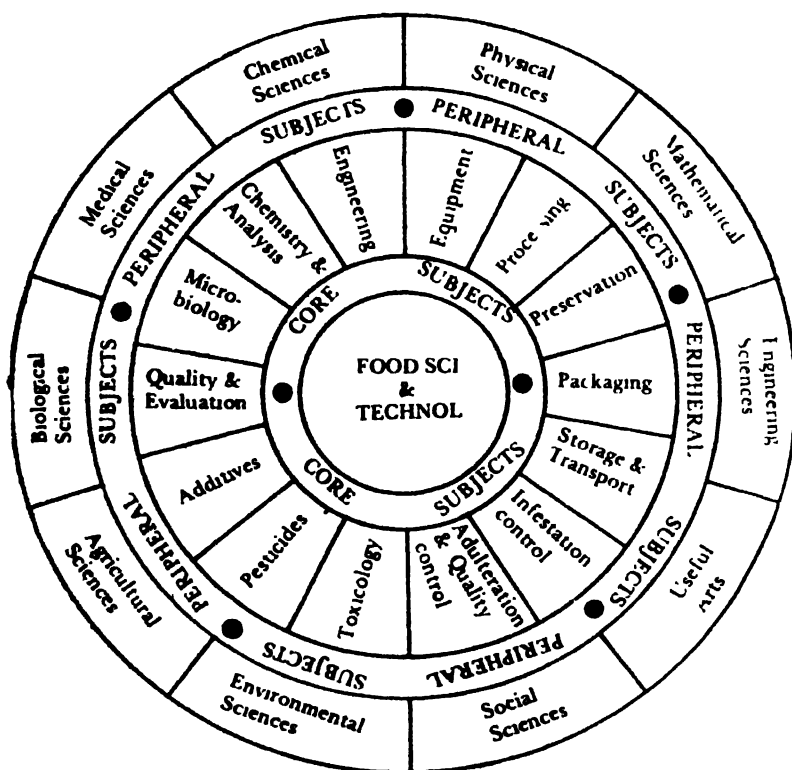
2 CFTRI LIBRARY

CFTRI was first established in 1950 and has grown as a multi-disciplinary institutue of world reput. Its library has grown with good collection of all kinds of documents to fulfil the needs of scientists of CFTRI and its Experiment Stations (Table 1). In 1966, the CFTRI introduced project oriented research as a result of which a demand was cast on the library to provide documentation service Three monthly documentation publications, namely, Library Bulletin (LB), Food Tehnology Abstracts (FTA) and Documentation List for Food Technology (DL) were therefore introduced. The library has been using *COLON* classification in successive editions since 1950. In the 6th edition only F 53 is available for food technology and all other isolates derived arbitrarily as and when books of more complex nature arrives. This was an unsatisfactory condition and there was a general feeling that this situation should be remedied. Therefore, with the need for classifying microdocuments in documentation publications and books which started assuming complexity, a depth classification which could cope up with such documents was decided upon to be developed. Hence, one of the authors (SVS) spent two months at DRTC, Bangalore and came out with an experimental schedule which was tried for suitable amendments and subsequently published in 1970.

3 FOOD TECHNOLOGY AS A DISCIPLINE

Food Technology can be considered as one of the oldest technologies known to man. Many preservation techniques like sun drying, cooling pickling and fermentation, smôking and salting, storage in oil or fat were known as early as 2000 B C. However, the principles underlying these technologies were not known till a much later era which saw actual scientific discoveries. Even in the 19th century, when canning was discovered, its scientific basis was explained only after Pasteur's findings on micro-organisms were reported. Later

many other discoveries in chemistry, biochemistry, agriculture and nutrition have influenced the development of modern food technology⁴ which has grown phenomenally as a multidisciplinary science (Fig. 1) during this century. The schedule dealt with in this paper is only for the core areas of discipline. For other independent subjects, their new basic class numbers¹ with the other facets taken from the 6th edition of CC are used. Subject device and phase relations are used extensively whenever needed.



Food Science & Technology : Inter-Disciplinary Nature

4 THE SCHEDULE DRAFTING

The drafting of the schedule itself was in several steps as demanded by the design methodology. At first, an intense study was made of the highways and byways of the subject in order to define the subject in clear terms with respect to classificatory needs. For this purpose, reference works including

the following were referred :

41 Books

- 1 Bender (AE). Dictionary of Nutrition and Food Technology, 1960.
- 2 Brogstrom (G). Principles of Food Science. 1968.
- 3 Clark (RJ). Process engineering for the Food Industries. 1957.
- 4 Encyclopaedia Britannica. 1965.
- 5 Jacobs (MB), Ed. Chemistry and Technology of Food and Food Products. 1944. 2V., Ed. 2 1965. 2V.
- 6 Kirk (RA) and Othmer (DF). Encyclopaedia of Chemical Technology. 15V., Ed. 2. 1964.
- 7 McGraw Hill Encyclopaedia of Science and Technology.

42 Reviews and abstracting periodicals

- 1 Advances in food research.
- 2 Recent advances in food science. 1962. 3V.
- 3 Research projects of CFTRI.
- 4 Abstracts of CFTRI papers.
- 5 British Food Manufacturing Industries Research Association.
- 6 Journal of Science of Food and Agriculture Abstracts.

The isolates were collected from the above documents as also from about 200 micro-documents selected and written on slips for purposes of testing of the schedule after drafting.

5 DESIGN OF THE SCHEME

51 Host Subject

Earlier "Food Technology" was taken to be one of the canonical basic classes coming under chemical technology. However, later ideas changed this concept. One of the canonical basic classes of the Main Class Technology was deemed to be 'F8 Commodity Production Technology'. Food Technology was considered to go with Commodity Production Technology as an isolate further dividable by the characteristic 'By Commodity'. Thus, Food Technology came to be represented as (5) F8 Commodity Production Technology (BC), 3 Food (IPI).

52 (IPI) Isolates

From the reference works studied the following conclusions were drawn regarding (IPI) isolates :

- (1) Food ready to be cooked and converted for table use.
- (2) Food that could be served directly.

Those isolates could be enumerated in (IPI) facet on the basis of various characteristics as follows :

521 *By Method of Consumption*

The isolates derived on the basis of this characteristic were of the following categories.

- 1 Food usually eaten,
- 2 Food usually drunk (beverage).

522 *By Source*

The isolates derived on the basis of this characteristic from the foods usually eaten could be grouped as

- 1 Food of plant origin,
- 2 Food of animal origin,
- 3 Food of microbiological origin,
- 4 Food of mixed source,
- 5 Spice, condiment and flavour.

The group 5 above contains materials of plant, animal and mixed origin, and synthetic compounds not used directly as food but are usually added to different foods for flavour, taste, etc.

5221 Food of plant origin The foods of plant origin were subdivided according to specialist preference as follows :

1 Cereal, 2 Pulse (legume), 3 Nut, 4 Vegetable, 5 Fruit, 6 Confectionery, 7 Bakery Product, and 8 Vegetarian food preparations.

The above categories were subdivided as follows :

- 1 Cereal : By literature warrant,
- 2 Pulse : By specialist preference,
- 3 Nut : By Taxonomy,
- 4 Vegetable : By part,
- 5 Fruit : By Internal structure,

6 and 7 Confectionery and bakery products : By specialists preference. The food preparation was derived by use of packet notation.⁵

5222 Animal products. The foods of animal origin were divided, in the first instance, into the following main groups;

1 Milk and milk products, 2 Meat, and 3 Meat preparations. Further divisions were as follows :

1 Milk : By Animal

2 Meat : By Source—e.g. animal meat, bird meat, sea animal meat.

Again, further subdivisions were as follows :

1 Animal and bird meat : By literary warrant,

2 Fish : By Taxonomy.

Isolates of meat preparations were derived by use of packet notation as in the case of vegetarian preparations.

523 Beverage

The first divisions were 'By Alcoholic Nature'.

1 Non-alcoholic beverages

(a) Carbonated beverage,

(b) Stimulant infusion (coffee, tea etc.),

(c) Fruit juice.

2 Alcoholic beverages

(a) Fermented,

(b) Fermented and distilled,

(c) Compound liquor.

524 Spice and Condiment

The first divisions were 'By Task/Flavour'.

1 Salt condiment,

2 Acid condiment,

3 Bitter condiment,

4 Bitter aromatic condiment,

5 Other (composite) preparations.

525 Flavouring Agents

These were divided as natural and synthetic flavours .

1 Natural flavours

(a) Essential oil and extracts,

(b) Terpeneless oil,

(c) Fruit and fruit juice,

(d) Dried fruit juice,

(e) Plant extract.

2 Synthetic flavours

(a) Alcohol, (b) ketone, (c) ester, (d) phenol ether, (e) lactone, (f) terpene, (g) aldehyde, (h) acid, (i) phenol, (j) Amine, and (k) Sulphur derivative.

The Appendix 1 gives the list of some commodity isolates.

53 Speciators is (IPI)

The food commodities which are partially processed for use as

raw material or ingredient in the production of the commodities discussed earlier are innumerable and therefore ' are not enumerated. They are to be derived on the basis of characteristics or speciators which are enumerated in a helpful sequence, by use of various devices specified in the schedules. The sequence of speciators was derived on the basis of Wall-Picture principle. The speciators together with sectors of notation allotted to them are as follows

<i>Speciator</i>	<i>Sector allotted</i>
By brand	(S—(A))
By make	(S (1))
By purpose	(S—1) to (S—9())
By Raw material	(S—0())
By Commodity	
By Processed form	
By Physical form of final commodity	(S—0(c)) to (S—0(t))
By Processed form of final commodity	(S 0(a))
By Composition (after processing)	(S 0za) to (S—0A)
By Cooking quality	(S 0D)
By Nutritive quality	
By Keeping quality	(S—zA)
By Environment	
By Flavour	(S—z1)
By Odour	(S—c)
By Taste	(S b)
By Time of use	(S—i)

54 Other Facets

The other schedules include

1 First Round Matter (1M) isolates of three kinds .

(a) Ideas denoting content of food,

(b) Ideas denoting extraneous matter or contaminant,

(c) Ideas denoting particular raw material used in production of food material [These are enumerated both in (1M) and (M) for (E)]

2 Schedule of Common property isolates

3 Schedule of Energy (E) Isolates

(a) Conversion, (b) Quality improvement, (c) Forming, (d) Decorating, (e) Preserving, (f) Filling and packing and (g) Material handling and storage

4 Differentiated schedules for (M) for (E) which include isolates based on the following characteristics :

(a) By Equipment, (b) By Technique of Processing, (c) By Operating Condition, (d) By Material used also used as (IM), and (e) By Method of Processing.

6 EVALUATION

The schedule was intensely tested by using it with the slips of references made in the beginning. These slips were taken to DRTC and seen by Ranganathan. He suggested several alternations and with the help of A. Neelameghan, these were carried out. After similar exercises, the final schedule was drafted and printed. This schedule is being used with food technology documents for over 12 years and have proved very successful. Its characteristic of flexibility has made it possible for intrapolating or extrapolating any new isolate emerging and thus it has been possible to classify any document that is received in the library. It has also helped in creating a database of documents included in Food Technology Abstracts (being published by CFTRI) and so far over 15,000 microdocuments have been classified for the database ready to be put into machine readable form.

Appendix 2 gives some examples classified by use of the schedule.

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- 4 Labuza, T., and Sloan, A.E., Forces of change : From Orisis to Open Dating. *Food Technology* 35(7) Jul '81 : 34-43.
- 5 Sangameswaran, S.V. and Gopinath, M.V., Schedule of Commodities in Food Technology. Paper Presented at DRTC Annual Seminar, 1966.
- 6 Neelameghan, A. and Sangameswaran, S.V., Array Division and Packet Notation. Presented at DRTC Annual Seminar. 1966.

APPENDIX I

Food Commodity Isolates in (IPI)

F8	Commodity Production	39b2	Field pea
	Technology	39b3	Chikling vetch
	Schedule of IPI	39b5	Sweet pea
	Food Commodity Isolates	39b7	Tangier pea
3	Food	39b8	Chick pea (Gram)
3v	Plant product	39bF	Pigeon pea
	T1 (A3) into (A2) begins	39f	Bean
3x	Cereal	39f1	Broad bean (Windsor bean)
	T1 (A4) into (A2) begins	39f2	Lima bean
3y	Paddy	39f3	Mung bean (Black gram)
31	Rice	39f5	White runner bean
32	Wheat	39f7	Scarlet runner bean
33	Oat	39fB	Green gram
34	Rye	39fD	Kidney bean
36	Barley	39fG	Cowpea
	T1 (A4) into (A2) ends	39fJ	Hyacinth bean (Horse gram)
37	Millet	39h	Soyabean
37b	Banyard millet	39j	Lentil
37c	Bulrush millet		T2 (A3) into (A2) ends
37d	Sp. ked millet	39za	Nut
37f	Pearl millet		T3 (A3) into (A2) begins
37h	Common millet	39zb	Gymnosperm
37k	Proso millet		T2 (A4) into (A2) begins
37m	Broom corn millet	39zc	Araucarian pine nut
37p	Hog millet	39ze	Pine nut
27r	Finger millet (Ragi)	39zg	Gingko nut
37t	Great millet	39zj	Gnetum seed
37B	Sorghum (Jowar)		T2 (A4) into (A2) ends
37B1	Sweet sorghum	39zn	Angiosperm
37B2	Durra		T3 (A4) into (A2) begins
37B3	Milo	39zp	Monocoty ledoneae
37B5	Broom corn		T1 (A5) into (A2) begins
37B6	Kaffir corn		
37B7	Kaoliang	39zq	Hot peanut
37B8	Shallu	39zr	Chufa
37D	Italial millet	39zs	Water chestnut
37E	Foxtail millet	39zt	Nicuri palmnut
37G	Job's team millet	39zu	Coconut
37H	Kodo millet	39zv	Palm chestnut
37J	Little millet	39zw	Coquita nut
37M	Maize (Corn)	39zx	Babassu nut
37N	Buckwheat	39zy	Hodgsonia seed
37P	Panic grass		T1 (A5) into (A2) ends
37R	Torpedo grass	39za	Dicotyledoneae
	T1 (A3) into (A2) ends		T2 (A5) into (A2) begins
39a	Pulse (Legume)	39zb	Pecan

	T2 (A3) into (A2) begins	39zC	Hickory nut
39b	Pea		
39b1	Garden pea		

APPENDIX 2

Examples

The necessary Alphabetical Index to Subjects (Class Entries) in the classified part has been given immediately following it.

Some of the subjects in the examples are multifocal. As the examples are meant mainly to demonstrate the method of constructing Class Number with the depth schedule, each and every subject dealt with in a document is not included in the list of samples. Only one or two subjects have been selected.

Classified Part

- F8, 3 Food Technology
 F8, 3-11; (C;2;5V-3L)—(90nb 2; 3L)—(2 2; 3K). 2; 42-Xzml; 2; 4 M Food Technology, Weaning Food, (Made of) Skimmed Milk Powder, Low Fat Peanut Flour, Refined Wheat Flour, Fortified With Vitamin, Pre-Cooked
- 1 N61 Narayana Rao (M) and others Development of pre-cooked balanced protein food suitable for weaned infants. (Symposium on proteins (1961) (CFTRI) p. 286.
 F8, 3-13; (C15 6, 8)—Vaz 15-Tz 23 2, 42-XZj 2; 3L 2; 27 6; 4-zb5
 Food Technology, Infant Food, (Made of) Pasteurised Buffalo Milk, Fat 15 Per Cent, Protein 23 Per Cent, Fortification with Vitamin, Powdering, Homogenisation, Roller Drying
- 2 N60 Chandrasekhara (M R) and others. Large-scale production of roller dried infant food. (Infant food from buffalo milk. 6). (Food Sc 9; 1960; 1)
 F8, 31; (1-Zb) 2; 3J 6; J-u8" y8
 Food Technology, Rice Food, Untreated Rice, Milling, Curing in Closed Vessel, Standard
- 2 N64 Standardisation of Conditions or quick artificial aging (curing) of fresh rice on large-scale. (Research Projects, (CFTRI) (1964), p 61.
 F8, 31; (1-Zb) 6; 44-z18-zzR150—140-zzJ30←—10. 6; 6
 Food Technology, Rice Food, Untreated Rice, Heating in Gas, 140-150°C, 10 To 30 minutes, Sterilisation.
- 4 N69 Hindustan Lever Ltd. Sterilised Rice and Rice Dishes and Preparation of the Same. (Indian Patent. 115013 (1969 Jan 21) (Indian Sc abstr 5; 1969; 4100)
 F8, 39b8-0 (a6; 4); cRT; 186 & F8. 3 : 7; A-Z1
 Food Technology, Bengal Gram, Dried, Colour, Variability, influenced by Canning.
- 5 N59 Siddappa (G S). Canning of dried Bengal gram (*Cicer arietinum*). (Ind j hort. 16; 1970; 170).
 F8, 39h1-ZT-Ze; ZMn; b12 & F8, 39h1 : 3; 97-z24-zzR50←—45-zzJ5.

TABLE 1 Statement showing document collection at NICFOS

Sl. No	Description	1964	1967	1970	1978	1981	1985
1	Books	6,129	7,799	9,700	12,690	16,220	18,625
2	Periodicals	468	—	646	701	730	775
3	Bound volumes of periodicals	7,417	9,368	11,616	17,432	21,362	23,558
4	Pamphlets, Reprints, etc	2,580	5,600	6,584	8,230	10,000	12,500
5	Annual Reports	—	—	—	300	378	429
6	Patents	26,004	41,032	56,028	70,718	1,60,556	1,68,000
7	Standards	1,679	2,837	4,758	9,847	10,258	16,200
8	Reference Materials	—	—	—	720	1,200	2,000
9	Thesis and Dissertations	—	—	—	517	618	786
10	Microforms and photocopies	—	—	—	831	1,100	1,500

2.14 Structure and Synthesis in DCC: An Analysis

**P. SANKARALINGAM, K.S. RAGHAVAN,
P. GANGADHARA RAO**

DDC since its origin has adopted certain devices for synthesis. The recent editions indicate an expansion in the use of these devices. The use of 'tables', 'add' device, and the 'instructions and general guidelines' regarding 'citation order' and the resulting structuring of compound and complex subjects, shelf arrangement of documents and/or arrangement of entries in a classified catalogue are examined. The similarities between this and the approach of CC are brought out. The 'Area Divisions' and 'Divisions of Individual literature' are examined and compared with the approach of CC. The facet sequence for the Class 'Literature' is shown to be more or less identical in CC and DDC. The division of geographical areas in DDC and the 'Space' isolates in CC are shown to be based on 'Similar characteristics; the structuring of compound isolate ideas in the two schemes are shown to be parallel to each other. These changes in the recent editions of DDC seem to reflect an impact of Ranganathan's general theory of classification on the scheme. The need for standardising the approach to 'Standard Sub-Divisions' and the use of 'add to' device on the basis of definite principles such as these formulated by Ranganathan and others is emphasized.

1 INTRODUCTION

The DDC that celebrated its centennial in 1976 is certainly not the same as the original scheme of classification that first appeared in 1876 with its one thousand classes on three hierarchical levels. The first edition appeared in 1876 and consisted of 12 pages of introductory matter, 12 pages of schedule and 18 pages of index. There was an immediate reaction to this by librarians as too detailed for any but very large libraries. The huge 14th Ed. however, consisted of nearly 2000 pages (including the index). The editorial committee reacting to the protests about 'unnecessary details' brought out a much abridged 15th ed. But, the trend of growth has been maintained in the subsequent additions as seen from the Table 1.

TABLE 1

<i>Ed.</i>	<i>Year</i>	<i>No. of pages</i>	<i>No of entries in the Schedule</i>	<i>No of entries in the Table</i>
16	1958	2439	17928	69
17	1965	2480	17113	5223
18	1971	2685	18980	7161
19	1979	3000	21504	8024

This growth suggests the enormous number of subdivisions that are possible, because literature may exist upon them. It also suggests that the scheme is highly flexible to have permitted such an expansion. To a significant extent Dewey even anticipated the value of synthetic scheme of classification although he did not fully recognise the possibilities of this.

The major criticisms levelled against DDC are :

1 It lags behind when examined in the light of modern theories; DDC being largely enumerative and committed to a certain degree of integrity of notation is finding it increasingly difficult to be completely abreast with modern theories of classification.

2 Though the recent editions display a trend towards analysis and synthesis, the rigidity of its frame work makes it quite unsatisfactory.

Needless to say that a scheme that has survived for over one hundred years, in spite of merited criticisms, must have virtues which in practice outweigh most of the theoretical objections.

2 OBJECTIVES OF THE STUDY

This study is aimed at :

1 Examining the developments in DDC intended to introduce certain synthetic features into a largely enumerative base through the various editions and more particularly since the 13th edition. The 13th edition was the first to be published after Melvil Dewey passed away and the 14th ed was the first edition to be published after a faceted classification (first edition of Colan Classification) made its appearance. The techniques of analysis and synthesis have since been fully developed by Ranganathan and his associates in India and by many others in Europe. It should not, therefore, be surprising if these developments have influenced the subsequent editions of Dewey

Decimal Classification.

2 Examining the structure and certain features of DDC and particularly:

- (a) the resulting sequence of specific subjects going with a host class; and
- (b) the structuring of compound subjects.

It is impossible in a study of this nature to examine in detail the schedules of a voluminous classification scheme like DDC. However, examples will be drawn from the scheme to highlight certain structural attributes of the system.

3 DDC AND ITS LAYOUT

Dewey's use of decimal notation has been described by Ranganathan as the most potent and lasting contribution of Dewey to the philosophy of library classification. The notational pattern and the systematic arrangement were set primarily in the 2nd ed. published in 1885. It is interesting to note that most of the important features that are present in the current edition of DDC (19th ed.) were introduced for the first time in the 2nd ed. Some of these are :

- (i) the use of three figure notation with a decimal point following the third digit if further subdivided;
- (ii) a separate table of 'form divisions' applicable throughout the schedule as against the enumeration of form divisions at main class headings where only they could be used;
- (iii) provisions at certain classes to 'divide like' various other numbers ("Add to" instructions since 18th ed.)

Of these, the last two features are essentially aimed at providing for synthesising class numbers for subjects not enumerated in the schedule. While the basic principles have remained more or less unaltered since 2nd ed., a large expansion in

- (a) the number of entries in the schedule;
- (b) the number of entries in the schedule that can be expanded;
- (c) the number of tables; and
- (d) the number of entries in the tables.

can be seen over the editions. The three basic reasons for providing for expansion by synthesis are :

- (i) to enable extension of the capability of the scheme in assigning class numbers to subjects encountered in practice;
- (ii) to ensure a certain amount of consistency in dividing different classes; and
- (iii) to achieve a certain degree of economy in enumerating the schedules.

4 SYNTHESIS IN DDC

In addition to the table of "Standard Sub-Divisions" digits which may be added to any base number, the other techniques in DDC for synthesis are :

1 "Add from Tables" : Tables 2-7 supply digits which a classifier may add to certain class numbers in schedules to sharpen them. At some places, where warranted, instructions are provided to add to a class number digits from two tables in succession.

2 'Add from schedules' : At various places in the schedule "Add to" instructions are given to sharpen a class number by adding to it digit from some other class number/any class number.

3 "Add from both tables and schedules" : In some cases, numbers from both tables and schedules can be added to base numbers to sharpen them.

In the following sections, these features of the recent edition of DDC and the resulting structure of subjects will be examined to demonstrate the similarities in the approaches of DDC and CC to structuring of compound subjects.

4.1 'Add' from Tables

Table 1 in DDC lists what are called 'Standard Sub-Divisions'. This table has been present in some form or the other since 2nd ed. An examination of the entries in the table reveals that the table does not include entries derived by the application of a single characteristic; instead it appears to accommodate several distinct types of divisions of more or less general applicability.

For example, the divisions 03, 05 and 08 denote bibliographical forms; 01 denotes sub divisions of general applicability as

well as bibliographical forms; 02 (miscellany) is used to introduce even phase relations in addition to bibliographical forms; 06 is used to introduce what Ranganathan would call a Posteriorising common personality isolate; 07 is again found to be a mixture of a variety of ideas of different types.

In effect the table of 'Standard Sub-Divisions' is an amalgam of many, often unrelated, types of ideas.

Form example, it includes :

- (i) Form divisions such as tables, bibliographies, dictionaries, etc;
- (ii) Certain generally applicable aspects such as philosophy, scientific principles, etc;
- (iii) Certain generally applicable actions such as classification, study and teaching, etc;
- (iv) Treatment of a subject from particular viewpoints *i.e.* with a bias;
- (v) Certain commonly applicable entity type ideas such as organisation, institution, etc.

Obviously this has led to a certain amount of confusion and results in unhelpful grouping of documents on shelves and entries in a classified catalogue. There is, therefore, a need for systematisation based on definite principles.

For example, a reorganisation of the schedule of "Standard Sub-divisions" in a manner parallel to the scheme suggested below may be considered :

1 Form Divisions such as encyclopaedias, dictionaries, bibliographies, etc.

2 Particular view points such as bias.

3 Generally applicable 'action' type ideas such as study and teaching, classification, etc.

4 Generally applicable 'property' type ideas such as philosophy, scientific principles, etc.

5 Generally applicable 'entity' type ideas such as organisation, institution, etc.

Such a reorganisation of the schedule of standard sub-divisions is possible within the existing framework of the notational system of DDC, and will lead to a logical and more helpful grouping of documents on shelves and entries in a classified catalogue.

411 Area and Time Divisions

From the 2nd ed. Dewey recognised that area divisions are common and may be required to be added to any base number. Yet a separate area table was introduced only in the 17th ed. The area table of the current edition incorporates several features which need to be examined.

The idea 'world' (space) is treated in a similar manner in CC and DDC. In both the schemes the digit '1' is used to represent the area division 'world' which is further subdivided by a number of characteristics. In DDC the first division is restricted to areas not limited by continent, country or locality. The divisions 3-9 are used for specific continents, countries, localities, etc.

The notion of space and its manifestation in subjects can be of any one of the following types :

- | | |
|--|---|
| (a) Physiographic features | <i>e.g</i> : Mountain, River, Valley etc. |
| (b) Political and other geographical divisions | <i>e.g</i> : Continent, Countries, States, Districts, etc. |
| (c) Zonal divisions | <i>e.g</i> : Tropical Zone, Subtropical Zone, Temperate Zone, etc. |
| (d) Population Clusters | <i>e.g</i> : Titles, Towns, Villages, etc. |
| (e) Divisions based on certain other characteristics | <i>e.g</i> : Developing countries, English speaking countries, Muslim countries, etc. |
| (f) Orientation division | <i>e.g</i> : East, North, South, West, etc. |

It may also be a combination of one or more of the above.

DDC provides for such combinations. It is interesting to note that such divisions were first introduced in the DDC along with the introduction of a separate Area Table in the 17th ed. (1965). It may be mentioned here that such divisions have been provided for in the CC since its inception. In DDC divisions of the "World" based on zonal, physiographic, orientation, socio-economic, linguistic, etc. considerations are provided for in the very first division of the area table. Further, rules have been provided by which number for such divisions restricted by a particular geographic or political division can be synthesised.

Examples

	<i>CC</i>	<i>DDC**</i>
Communist countries	1(W 91)	— 1717
English speaking countries	1(P 111)	— 17542
Hindi speaking areas of India	44(P 152)	— 54009759143
Rivers of India	44.pl	— 54009693

**In DDC 17th, 18th and 19th ed. there is an alternative rule by which, if desired, the area number could be—1759143054 for Hindi speaking areas of India and—1693054 for Rivers of India. In other words the divisions can be either way

The structure of the isolate numbers in the two schemes are seen to be parallel

The 'Space' type ideas forming constituent components of subjects fall into :

- 1 Areas not restricted by a continent, country, or locality, etc.
- 2 Areas restricted by a continent, country, locality, etc.

The order of precedence in CC and DDC is as follows :

- 1 Areas not restricted by countries, continents, locality, etc but restricted by physiographic, zonal linguistic, etc characteristics.

- 2 Areas restricted by country, continents, locality, etc. within each country, continent, locality, etc. areas restricted by physiographic, zonal linguistic, etc characteristics.

Further, grouping of documents on a particular class involving on area division will be parallel to :

TABLE 2

<i>DDC</i>	<i>CC</i>
Regions not restricted by country, continent, locality, etc	Regions not restricted by country, continent, locality, etc.
By Zone	By Physiographic features
By Physiographic features	By Zone
By Socio Economic characteristics	By Orientation
By Orientation	By Socio-economic characteristics
Regions restricted by country continent, locality, etc.	Regions restricted by country, continent, locality, etc
	By Sea

The nature and the type of characteristics used for division in both the schemes are seen to be more or less identical. Both

schemes provide for sub-division of political divisions by other characteristics.

The notation of 'time' as a common idea of general applicability has been recognised and provided for in DDC. The 17th and 18th ed in an effort to improve upon the provisions of earlier editions provide for adding to a base number both area and time divisions simultaneously. The recommended facet sequence was Base Number+Area+Time which is parallel to the facet structure of CC. Further, in DDC time divisions begin with a '0' and area divisions begins with a rich digit (1-9). This results in the following sequence of subjects going with a host class.

Host Class

Host Class+Time Division .

Host Class+Area Division

Host Class+Area Division (Restricted to continent, country
Locality)+Time Division

Host Class (Direct Sub-divisions of—)

This sequence is parallel to that in CC, secured by the principle of inversion.

In the 19th ed. however, the simultaneous use of area division and time division is restricted to only a few classes (for example : 330.91—.99 Economic Geography).

412 *Divisions of Literature*

An important feature of the recent editions of DDC is the provision of a separate table for individual languages on the lines of CC. Further, instead of enumerating different literary forms under each language in the schedules, a separate table of 'Sub-Divisions of individual literatures' is provided. The adoption of facet analysis is no where more evident in DDC than in its class 'Literature'. In DDC 'Literature' is divided successively by the following characteristics.

Language

Form

Period

Work (for voluminous authors only)

The characteristics used in CC to divide the class 'Literature' are :

Language

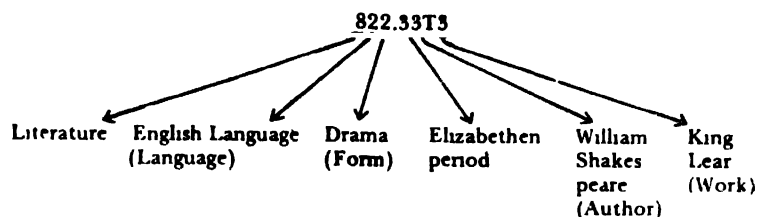
Form

Author (to be got by chronological device)

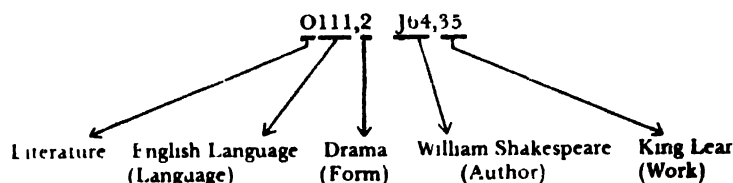
Work

The similarity in the approaches of the two schemes is obvious. Further, the facet sequence is also more or less the same.

For example, Shakespeare's King Lear is represented by the Class Number



In the CC the number for the same document would be:



The facet sequence is seen to be identical.

42 Add from Schedules

Provisions for synthesising a class number by adding to a base number, part or whole of another class number from a schedule have been greatly extended since the 17th ed.

Examples :

026 Libraries devoted to various specific disciplines and Subjects

Add 001 — 999 to base number 026 *e.g.* 026 61 Medical Libraries

025.58 Library use studies

Add to base number 025 58 the numbers following 02 in 026—027, *e.g.* Use of Government Libraries 025.5875.

However, what is to be noted is the lack of adherence to any definite principle in the structuring of subjects. Let us consider the class '633—635 specific plant crops'.

Provision for synthesising class numbers for compound subject by the use of 'add to' device in this class was introduced for the first time in the 17th ed.

- E.g.* 630 = Agriculture
 633 = Field Crops
 633.1 = Cereals
 633.11 = Wheat

For deriving the class number for the subject 'Harvesting of wheat' the digit denoting 'Harvesting' is added to this base number resulting in the class number 633.115. This clearly reflects a structure parallel to:

Basic Class + Personality + Energy

Similarly, the class number for 'Fungus Disease of Wheat' is 633.1194

This reflects a facet structure parallel to

Basic Class + Personality + Matter Property

The sequence of components in these subjects is parallel to that in CC. This structure is not, however, uniformly adopted in all classes. For instance let us consider the subject 'Cataloguing of Sound Recording'.

- 020 Library and Information Science
 025 Library Operations
 025.3 Bibliographic Analysis and Control
 025.34 Cataloguing, Classification and Indexing of special materials.

For deriving the number for the subject 'Cataloguing of Sound recordings' the digits denoting 'sound recordings' is added as per instructions to this base number resulting in the class number 025.3482.

This reflects a facet structure parallel to :

Basic Class + Energy + Personality

In other words, the facet structure of CC is reversed in this case.

Here again, one sees the need for adoption of definite guiding principles such as those suggested by Ranganathan.

43 Citation Order

The foregoing sections explain some of the synthetic devices adopted by DDC to construct number for subjects not enumerated in the schedule. But an examination of the schedules reveals that the editors feel it quite unnecessary to provide for close classification of many compound and complex subjects. In such cases the classifier is faced with the problem of decision making regarding where to class a subject. In other words, the question of priority arises since the specific subject

of the document may be considered as subordinate to two or more broader classes. The 19th ed. of DDC recognises this problem as one of 'Citation Order'. (Similar provision in the form of 'table of precedence can be seen in the 17th and 18th ed). The following rules are provided as a guide for the classifier in assigning the subject to the correct class.

431 *Instructions in the Schedules*

The instructions given at the point of application or above that point in the same hierarchal chain should be followed. The instructions take the form of any one of the following :

- (a) *Table of precedence* : Tables of precedence are given at several places (e.g. 364 Criminology). Generally, these suggest to class a compound subject with the broader subject occurring later in the schedules. An examination of the division of subjects in DDC reveals the following pattern (There are, however, notable exceptions to this). Subjects are first divided by the application of the characteristic 'Process' and only subsequently by the characteristics 'Entity'. This pattern can be observed in the schedules of Library and Information Science, Agriculture, Medicine, etc. In effect this rule would result in classing a subject involving a 'Personality' type idea and an 'energy' type idea with the 'Personality' type idea.
- (b) *Order of Precedence* : Instructions are given at certain places suggesting a certain order of precedence. At some places the instructions suggest an order of precedence parallel to the schedule, e.g., 331.3—331.6; at some other places, as in 365, the order of precedence is the reverse of the sequence of classes in the schedule.

Example :

'Maximum Security Prisons for Women'

365 — Penal Institutions

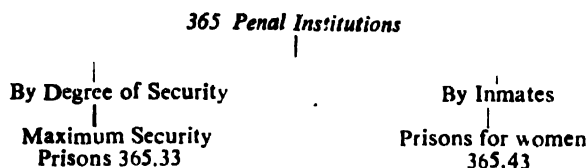
365.3 — Kinds of Penal Institutions

365.33 — By degree of Security — Maximum Security

365.4 — Institutions for specific classes of inmates

365.43 — For adult women

It is seen that the subject 'Prisons' is divided by the application of two characteristics, viz. 'Degree of Security' and 'Classes of inmates'.

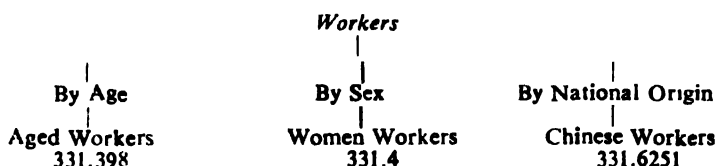


The scheme does not provide for synthesising the class number for the above mentioned subject. The question arises as to where the subject should be classed. The instruction suggests that it should be classed at 365.43 and not at 365.33

Example

'Aged Chinese Women Workers'

The subject 'Workers' is divided as below:



The instruction suggests that this subject should be classed under 331.398 with 'Aged Workers'

The Colon Classification also uses these characteristics (and a few others) for dividing the 'Personality' facet in 'Sociology' (it should be mentioned that when warranted a coextensive isolate number can be built by Superimposition Device). A careful examination will bring out the fact that the arrangement of documents on shelves and entries in a classified catalogue prescribed by the two schemes and the resulting grouping are parallel to each other. This is so because the host class under which the subject is classed is the same in both the schemes.

[At certain places cross reference are given that suggest classing of a subject at a particular class number]

432 General Instructions

In the absence of explicit instructions in the schedules, certain general guidelines provided in the editor's introduction are to be followed.

- (a) In dividing certain classes into their sub-divisions DDC uses the digit '0' to indicate a change in the basis of divisions.

Examples**684.1 Furniture (Manufacture of —)**

Divisions	by Material
684.04	Woden Furniture
684.05	Metallic Furniture
684.06	Furniture in other materials

Divisions	by Type
684.12	Upholstered Furniture
684.13	Chairs & Tables
684.14	Desks

In classifying a document on, say 'manufacture of wooden chairs' preference is given to classing it under the notation without '0' in other words the subject is classed at 'manufacture of chairs' rather than at 'manufacture of wooden furniture'. This reveals a preference for classing a subject under its more 'concrete' aspect rather than the less 'concrete' aspect.

(4) Perhaps the most significant development in the current editions is the general guidance to class a subject in the following order of precedence.

Things: Kinds of things; parts of things; Materials from which things, kinds or parts are made	Personality
Properties of things, kinds, parts or materials	Matter Property
Processes, operations, agents	Energy

These categories straight away reflect Ranganathan's fundamental categories

The instructions in the schedules and the general guidance, when followed will result in a shelf arrangement of documents and arrangement of entries in a classified catalogue closely parallel to the one achieved by the Colon Classification.

5 CONCLUSION

The discussion in the foregoing sections and the illustrations therein are intended to demonstrate the similarity in the approach of the current edition of DDC to that which is being followed by Colon Classification more or less since its inception. DDC was not designed on the basis of a theory of analytico synthetic classification. Yet, from the very first edition it has displayed synthetic features. But these appeared only in an 'embryonic' form. The development of faceted classification on the model of Colon Classification and Ranganathan's theory can be seen to have had a definite impact on the development in DDC since 14 ed. and more particularly since the 17th ed. The device that have been built into the DDC have demonstrated that the scheme, even within the existing framework, is

capable of absorbing modern ideas/theories of classification. The forthcoming edition of DDC will do well to standardise the use of these devices on the basis of definite guidelines and principles such as those developed by Ranganathan and others.

2.15 Compatibility Issues Affecting Classification Systems : Relevance of Ranganathan's Normative Principles

S. SEETHARAMA

Since classification systems are at best compromises between opposing or conflicting views and requirements of different user groups, incompatibilities exist between them. Therefore, in this study, an attempt has been made to study the extent of compatibility among medical classification systems with special reference to the classification of cardiovascular diseases. The study of compatibility has been made at near-seminal level by the application of Normative Principles of the General Theory of Classification and at the phenomenal cardiovascular pathological conditions. Major findings and inferences based on the study have been given. On the question of studying compatibility among classification systems, the study indicates the large potential of the Normative Principles and that their application help in understanding the quality of the chosen structures in the systems investigated, their strength and weaknesses, etc. Further, the study has shown that Freely Faceted Classification System designed taking into consideration the Normative Principles can be used as link/switching languages for achieving compatibility. This, then, reaffirms the fundamentality of the Normative Principles of the General Theory of Classifications even in the present day context.

1 PREAMBLE

To begin with Classification Systems (CS) developed were "Universal" in that they were not confined to the classification of a subject or few subjects but covered all the subjects in the Universe of Knowledge. These Universal Classification Systems developed were necessarily of broad extension and small intension only. Some of the Universal Classification Systems developed were the Dewey Decimal Classification, Universal Decimal Classification, Library of Congress Classification, Bibliographic Classification of Bliss, Colon Classification and Library—Bibliographic Classification.

While the Universal Classification Systems were very useful in organising macro-documents such as books, they were

found to be inadequate for classification of micro-documents. This was because of the fact that micro-documents were of great intension. Further, the Universal Classification Systems could not keep pace with the growth of the Universe of Subjects—a manifold multi-dimensionally dynamic, turbulently growing continuum. In addition, they fell short of the needs of the specialists who required a CS detailed enough for all concepts as well as for all conceivable relationships among them.

As a consequence, there was a spate of activity in the development of Special Classification Systems for the classification of documents of special kinds of special form—microfilm, phonograph record, etc.—, and covering highly specialised subjects individually, such as Electronics, Management Science, Pathology, etc. In addition, in the sixties and thereafter, thesauri development was taken vigorously. Thus during the last few decades, numerous vocabulary control devices, such as Special Classification Systems and Thesauri were developed to suit with the differential requirements of the different groups of specialists.

While it was expected that the prolific development of vocabulary control devices would facilitate better access to information, it created problems as CS and thesauri caused hindrance to the exchange of indexed items and thereby to cooperation between information systems and services. This was because of the fact that vocabulary control devices are designed and developed to satisfy particular purposes. Hence, a certain degree of incompatibility exists among them. This is not surprising as there is not as yet any generally accepted theoretical basis for selecting keywords and arranging them in lists or thesauri. Further, they are at best compromises between opposing or conflicting views and requirements of different user groups. Three approaches are possible to achieve compatibility between different information systems using different classificatory languages. They are :

(i) Giving up individual classificatory languages in favour of one classificatory language (an existing or a newly developed one) to be used by all the linked systems;

(ii) Establishing concordance between different classification systems; and

(iii) Developing a "Switching or an Intermediary language".

The first approach may not be feasible due to the differential requirements of different user groups as well as due to the obsession about an apparent incompatibility between the attributes of Universal Classification Systems covering the whole or nearly the whole of Universe of Subjects and Special Classification Systems covering smaller chunks of the Universe of Subjects. Another difficulty, perhaps, is the feeling that CS have to be developed for shelving and bibliographical purposes separately. In other words, no CS can serve both the purposes.

The second and third approaches, on the other hand, depend on how exactly the equivalence between two elements of a documentary language/classification system can be identified and established—that is, the problem is that of recognition of equivalence among the elements.

But, a basic pre-requisite for achieving compatibility among CS is the identification and recognition of the degree of compatibility existing among them. The method suggested for this type of study has been the development of a Table of Equivalences. As an alternative, it was felt that Ranganathan's Normative Principles of the General Theory of classification used in the design of freely-faceted CS may be useful for studying compatibility as well. This is because it was felt that the method of application of Normative Principles for the purpose of studying compatibility has taken into consideration the important points raised by Dahlberg, Smith, Wersig, Soergel when they advocated Table of Equivalences for compatibility studies. Further, it would show the degree of relevance of Ranganathan's Normative Principles in the present day context.

Hence, a research investigation was undertaken on Compatibility Among Medical Classification System focussed on :

(i) Study of compatibility between the respective essential elements of CS;

(ii) Application of Normative Principles of the General Theory of Classification to study compatibility among CS at near-seminal level; and

(iii) Study of compatibility at the phenomenal level.

2 DEFINITIONAL ANALYSIS

In attempting to discuss the subject of compatibility, it would

be helpful to define and delimit the use of the terms and consider some of the resulting implications. This is especially because the meanings of terms depend on the context in which they are used. Therefore, for any purposeful discussion which will ensure some degree of success, defining of terms becomes essential.

21 *Compatibility*

UNISIST report defines compatibility as "a quality of systems whose products can be used interchangeably, notwithstanding differences in notation, structure, physical carriers, etc. without any special conversion machinery".

Broadly, the term "compatibility" has been used in two contexts by different people. Firstly, it has been used generally to indicate the quality of system whose products can be used interchangeably and by implication that when compatibility is present between two systems, there would not be undesirable effects. On the other hand, in a specific sense, the term has been used to indicate the quality of ordering systems which permits the elements of one system to be used together or interchangeable with that of the other. By implication, it would mean that not only the elements of the different information system can be used together or interchangeably, but also the products of processing of such information languages without any loss of information. In other words, one can see emphasis on two aspects in the various definitions—(i) Interchangeable use and (ii) Mutual harmony.

At this juncture, it would be worthwhile recalling Dahlberg's observations on interchangeable use—"There are many purposes for the interchangeable use of an ordering system, as e.g. for improving and supplementing a system, for an exchangeable use of it in cooperative indexing and retrieval, for switching between a number of ordering systems".

22 *Convertibility*

Convertibility, on the other hand, "implies the use of some kind of manipulation to make the results and products of processing in one system usable in another".¹ Without referring to the concept of manipulation, Henderson⁵ uses the term as applied to vocabularies and regards convertibility as "the ability to go from one indexing vocabulary to another".

In other words, conversion involves the process of transforming information records with regard to transcription, encoding, data structure, etc., so as to make them interchangeable between two or more services or systems using different conventions and media.

In regard to the relationship between convertibility and compatibility, it is said that the former is dependent on compatibility between systems, procedures, collections, indexing language, indexes and users.

23 *Interconnection*

Interconnection means connection between two or more, i.e. mutual connection, and interconnect means to connect mutually or with one another. In the context of information systems, "whether computer-based or manual, there are many processes and many mechanisms for transfer of different elements of information. It may be in coded or uncoded forms. All of these ideas may be involved in some way in what most of us probably mean when we say "interconnection". To information system designers and engineers the word implies a reciprocal relation."

3 RESEARCH UNDERTAKEN

As in the field of Medical Science, tremendous advances have been made in recent times, it was felt that a study of compatibility among Medical Classification Systems—as many have been designed—would be useful.

The specific objectives in relation to the problem of research are:

- 1 To study compatibility among Universal Classification Systems in the field of Medical Sciences;
- 2 To study compatibility among Special Classification Systems in the field of Medical Sciences;
- 3 To study compatibility between Universal and Special Classification Systems in the field of Medical Science.

In other words, the overall objective of the research study was to study compatibility among Medical Classification Systems. Since the field of Medical Sciences was rather a big field, it was felt that if the study was restricted to the sub-field "Cardiovascular diseases", it would yield some meaningful results.

The research undertaken seems to be in conformity or, perhaps, anticipated as it were, one of the methodological recommendations of the Augsburg Conference on Classification Research which suggested research and development programmes in the area of "Classification as a user-oriented activity". The specific relevant recommendation was "...To establish compatibility between and integration existing classification systems and thesauri in order to promote ease of use of the many existing information systems".⁶

As a prelude to this investigation, it was proposed :

- (a) To survey the methods for studying compatibility;
- (b) To identify problems of compatibility; and
- (c) To identify and study the methods for achieving compatibility.

This was considered necessary as it would facilitate in providing an overview of compatibility research as well as aid in the choice of the appropriate method/procedure to be adopted for the study.

4 METHODOLOGY/PROCEDURE

The steps involved are :

- (i) Choice of Universal and Special Classification Systems;
- (ii) Study of compatibility between the respective essential elements of classification systems;
- (iii) Study of compatibility with the Basis of Reference, at the phenomenal level, by the application of a set of Normative Principles;
- (iv) Study of compatibility, at the practical level, between classification systems by classifying a set of few hundred cardiovascular pathological conditions;
- (v) Analysis of observations; and
- (vi) Consolidation of findings.

4.1 *Choice of Universal and Special Classification Systems*

The classification Systems chosen for the study of compatibility were :

(a) UNIVERSAL CLASSIFICATION SYSTEMS

- (i) Universal Decimal Classification (=UDC)
- (ii) Colon Classification (=CC)

(b) SPECIAL CLASSIFICATION SYSTEMS

(i) Standard Nomenclature for Diseases and Operations
(=SND0)

(ii) International Classification of Diseases (=ICD)

The criteria governing the choice of the above-mentioned universal and special classification systems were :

- (i) Familiarity with the classification systems concerned;
- (ii) Features—enumerative and faceted—of the classification systems concerned.

42 *Study of Compatibility between the Respective Essential Elements of Classification Systems*

In relation to the study of compatibility between the respective elements of classification systems concerned, each classification system was studied in regard to its genesis, structure and the method adopted for classifying. Special points, if any, were also looked into. Once this was completed, correlation of the respective essential elements was attempted so as to create or establish a concordance between the systems concerned.

43 *Study of Compatibility at Theoretical Level by Application of Normative Principles*

Compatibility between classification systems can be studied at the theoretical and pragmatic levels. At the theoretical level, it would be ideal if one can compare the respective theories forming the foundation of the systems. Unfortunately, most of the classification systems do not have explicitly stated theories which could be compared. Therefore, as an alternative, it has been suggested⁴ that one can apply a certain set of Normative Principles i.e Postulates, Principles and Canons and observe to what degree each of classification systems conforms to them. Accordingly, the various Normative Principles derived from the General Theory of Classification as enunciated in the Prolegomena⁷ have been applied to the Universal and Special Classification Systems.

44 *Study of Compatibility at the Pragmatic Level*

At the pragmatic or practical level, the compatibility between the Universal Classification Systems UDC and CC has been studied by classifying 459 compound subjects in the field of

"Cardiovascular diseases". In regard to compatibility between **Special Classification Systems** on the one hand, and between **Universal and Special Classification Systems** on the other, the 544 cardiovascular pathological conditions enumerated in the SNDO schedule were taken as the representative sample for classifying. Individualisation and co extensiveness were looked for in the class numbers/code numbers given by the various classification systems.

45 *Analysis of Observations*

The observations made on the basis of the study in regard to the classification systems concerned were analysed to cover the following aspects :

(i) *Concordance*

- Factors/features favouring establishment of concordance
- Conformity of classification systems to Normative Principles
- Compatibility between classification systems at conceptual, Verbal and Sequence levels
- Factors contributing to compatibility
- Factors contributing to incompatibility

The results obtained in relation to classification of cardiovascular pathological conditions were statistically analysed using the z-test at 0.05 significance level when the critical value of z-statistic was 1.645.

5 OBSERVATIONS

51 *Application of Normative Principles*

The Normative Principles derived from the General Theory of Classification fall into the following categories :

- (i) General Laws
- (ii) Laws of Library Science
- (iii) Canons of Classification for Work in the Idea Plane
- (iv) Canons of Classification for Work in the Verbal Plane/
Notational plane
- (v) Canons for Book Classification
- (vi) Postulates of Classification
- (vii) Principles for Helpful Sequence

Since the investigation was specifically in relation to classification systems, it was felt that it would be sufficient if the canons for classification in the three planes—Idea Plane, Verble Plane and National Plane—, postulates of classification, and principles for helpful sequence were applied. Accordingly, they were applied on the classification systems chosen and their conformity or otherwise to them was studied. observations are given in the following table on next page.

52 Compatibility at Pragmatic Level

521 Universal Classification Systems

It has been observed that Colon Classification yields more numbers of co-extensive numbers than UDC. This has been tested statistically using the z test at 0.05 significance level when the critical value of z-statistic is 1.64. The differences between CC and UDC in relation to the extent of co-extensiveness would give rise to problems of conceptual and sequence incompatibility, though translation/switching compatibility will not be affected.

522 Special Classification Systems

In regard to Co-extensiveness, 60% of the SNDO numbers are co-extensive. However, majority of the SNDO numbers (97.4%) are individualised or unique in nature. On the other hand while co-extensiveness is not applicable to ICD code numbers it has been observed that a large majority (80.5%) of subjects are represented by homonymous numbers. Due to the different degrees of conformity to co-extensiveness and individualisation of SNDO and ICD, conceptual and sequence compatibility problems are likely to occur between them. However, translation or switching from SNDO to ICD would be possible though in the reverse direction from ICD to SNDO would be fraught with a large number of difficulties.

523 Universal and Special Classification Systems

In relation to co-extensive representation, statistical tests have shown that the Universal Classification System CC yields more number of co-extensive numbers than either SNDO or ICD. However, while in regard to individualised numbers the performance of CC and SNDO is similar, it is very poor in regard to ICD.

TABLE 1 : Conformity of UDC, CC, SNDO, and ICD to Normative Principles

<i>Normative Principles</i>	<i>UDC</i>	<i>CC</i>	<i>SNDO</i>	<i>ICD</i>
(a)	(b)	(c)	(d)	(e)
Postulate of Fundamental Category	Recognises space and time		Recognises to a limited extent as there is a distinct recognition of topographical aetiological axes	No distinct recognition
Rounds for Energy	Not recognised distinctly		No recognition	No recognition
Level and Level cluster	No clear indication of levels of manifestation. No consistency in regard to level cluster		Recognises level of manifestation though no distinct connecting symbol is given	Not applicable
Basic facet and Isolate facets	Recognises basic facet distinctly		Basic facet is implied Isolate facets recognised to a certain extent	Basic facet is implied, Isolate Facet not applicable
Concreteness	Recognises only Space and Time facets. Other facets are not separated due to its		Recognises to a limited extent	Not applicable

(a)	(b)	(c)	(d)	(e)
—Consistent Succession Canons for Array —Exhaustiveness —Exclusiveness —Helpful sequence	Limited extent Generally follows, but there are a few violations vis-a-vis Principle of Spatial contiguity		Limited extent Not fully conformed to in certain cases	Partial conformity Not applicable
—Consistent sequence	Achieved by use of common and special auxiliaries	Achieved by schedules of common isolates, and by use of devices such as (CD), (SD), (AD), Facet, Phase, Superimposition Mnemonic devices, etc.	Limited extent	
Canons For Chain —Decreasing extension —Modulation	Generally conforms, but, there are few true violations. In some cases, there are apparent violations possibly due to adoption		Generally conforms, but, there are few violations possibly due to adoption of Group Notation	Not applicable

(a)	(b)	(c)	(d)	(e)
Principles for Facet Sequence	<p>DC core having many compound subjects</p> <p>Generally follows but a few violations are seen which is in Consonance with LDC's non-conformity with Postulates of fundamental categories, concreteness, Level, and Cluster</p>		Generally follows though there are violations	Not applicable as it does not recognise facets as such

Canons for Work in

Idea Plane

Canons for characteristics

- Differentiation
- Relevance
- Ascertainability
- Permanance

Canons for Succession of characteristics

- Concomitance
- Relevant Succession

Partial conformity

(a)	(b)	(c)	(d)	(e)
tion of Group Notation				
Canons for Filiatory Sequence				
—Subordinate Classes				
—Coordinate Classes				
<i>Canons for Work in the Vertical Plane</i>				
—Currency		<p>Conforms to this Canon through its two committees FID/CA and FID/CCA</p> <p>Adopts semantic factoring. Avoids use of precombined descriptors and hence may appear as violating this canon</p>	<p>Conforms to this canon through the individual committees of the American Medical Association</p> <p>Conforms to this canon though in a few cases colourless terms such as "Other disorders" are used to be in conformity with the Canon of Exhaustiveness</p>	<p>Conforms to this canon by the Revision Conferences of Specialists of the World Health Organisation</p> <p>In a few cases, colourless terms are used to be in conformity with the Canon of Exhaustiveness</p>
—Retrice		<p>In few cases, uses colourless terms to be in conformity with the Canon of Exhaustiveness</p>		
—Enumeration		<p>Not used to full advantage</p>		

Not applicable as most of the basic Postulates, Principles, and canons are not conformed to

Conforms to this canon by the Revision Conferences of Specialists of the World Health Organisation

In a few cases, colourless terms are used to be in conformity with the Canon of Exhaustiveness

Conforms to this canon through the individual committees of the American Medical Association

Conforms to this canon though in a few cases colourless terms such as "Other disorders" are used to be in conformity with the Canon of Exhaustiveness

Adopts semantic factoring. Avoids use of precombined descriptors and hence may appear as violating this canon

Conforms to this Canon through its two committees FID/CA and FID/CCA

In few cases, uses colourless terms to be in conformity with the Canon of Exhaustiveness

Not used to full advantage

(a)	(b)	(c)	(d)	(e)
—Context	Not taken complete advantage (All the schemes of classification may have violated this canon sometimes for purpose of clarity at the individual isolate level)	Not taken full advantage	Not used to full advantage	Not used to full advantage
<i>Canons for Work in the Notional Plane</i> Canon of Synonym				
	Generally conforms to this canon. However, there are a few instances of synonymous numbers	Generally conforms to the canon though there are a few instances of violations. This is partly due to the autonomy given to the classifier in synthesizing class numbers	Generally conforms to Canon though there are instances of a few synonymous numbers	Synonymous numbers do not exist as such. But lack of specificity forces the classifier to choose among many broad numbers, and if consistency is not maintained synonymous numbers result
—Homonymy	Nearly 17.1% of the numbers in the schedule are homonymous	Generally conforms to the Canon though there are a few violations	Generally Conforms to though there are a few violations	Incidence of violations is very high. 80.5% of the 544 subjects enumerated are represented by 96 homonymous numbers Partial conformity
—Relativity	Apparent violations due to telescoping of arrays			
—Hierarchy	Apparent violations due to telescoping of arrays			
—Mixed base				
—Pure base				

(a)	(b)	(c)	(d)	(e)
—Faceted Notation				
—Coextensiveness	80% of the numbers are coextensive	95.1% of the numbers are coextensive	Partial	Non-conformity to this canon Not applicable
Canons for Mnemonics				
—Alphabetical				
—Scheduled	Used sparingly		—	—
—Systemic	Limited extent		Limited extent	Used sparingly Not applicable
—Seminal	Limited extent		Limited extent	Not applicable
Canons for Growing Universe				
—Extrapolation in array		Used sparingly		
—Interpolation in array	Non-conformity			
—Extrapolation in chain				
—Interpolation in chain	Limited extent			
			Non-conformity as there is no provision for extrapolation or interpolation in array and chain	Non-conformity as there is no provision for extrapolation in array and chain

6 FINDINGS OF THE STUDY

Some of the major findings and inferences of this study are summarised below.

61 *General*

1 The Normative Principles derivable from the General Theory of Classification are applicable to all classification systems for the study of compatibility among them.

2 Classification systems which are in conformity with the General Theory of Classification have a good chance of compatibility among themselves

3 Compatibility among classification systems is always in relation to a particular point of time. If, however, the systems are self-perpetuating and able to provide co-extensive numbers always for subjects, compatibility between them is ensured for all time.

4 Compatibility among classification systems may be unidirectional, bidirectional or multidirectional.

5 Vis a-vis Verbal Compatibility, classification systems using precombined descriptors may have to change frequently with changes in names occurring in the disciplines concerned. On the other hand, classification systems adopting a high degree of semantic factoring and thereby using elemental descriptors will not have a problem as meanings of the fundamental terms would not change very much frequently.

6 Conformity to the Canons of Terminology by different classification systems does not automatically guarantee Verbal Compatibility among them. This may be attributed to the difference in the degree of semantic factoring between the composite terms used in the classification systems.

7 The degree of specificity followed by classification systems can be considered as an indicator of compatibility between them.

8 Freely-faceted schemes of classification can be used helpfully as link/switching languages for achieving compatibility among classification systems.

9 Freely-faceted schemes of classification are well-suited for development into integrated schemes covering vericous classification systems due to their intrinsic self-perpetuating quality.

10 While autonomy provided to the classifiers by the Freely faceted schemes of classification has its advantages it is likely

to give rise to compatibility problems if consistency is not maintained.

62 *Compatibility between Universal Classification Systems*

While there seems to be overall compatibility between Universal Decimal Classification and Colon Classification, some of the features of the former give rise to some incompatibility. They are : The DC core : inadequacy in facet analysis; inadequacy of Colon device in the representation of passive and active relationships between concepts/classes etc., inconsistency in the pattern of arrangement of compound subjects; non-conformity to some normative principles, etc.

The observations/findings on compatibility are :

1 Both the Universal Classification System, UDC and CC, are generally in conformity with the Normative Principles. By implication, both of them exhibit an overall compatibility with each other at the broad level.

2 CC is fully compatible with the UDC. But UDC is not fully compatible with CC due to either partial or non-conformity with the Normative Principles by UDC.

3 Autonomy provided to the classifiers by the freely-faceted classification systems like CC or almost freely faceted classification systems like UDC would give rise to compatibility problems due to the occurrence and/or synthesis of synonymous or incorrect isolate numbers and class numbers.

4 The various types of equivalences met with in relation to UDC and CC are :

- Precise equivalent
- Approximate equivalent
 - Broader
 - Narrower
 - Related
- No equivalent

5 Three types of incompatibility—Conceptual, Verbal, Sequence—are encountered between the Universal Classification Systems UDC and CC.

63 *Compatibility between Special Classification Systems*

Despite the fact that SNDO and ICD are special classification systems covering subjects going with the specific subject “Human Diseases” some compatibility problems are encountered between them. However, there seems to be overall

correlation—though not conceptual—between them in that a large majority of compound subjects dealing with cardiovascular diseases are represented in both the systems. The following are observations pertaining to concordance and compatibility.

1 In establishing concordance between SNDO and ICD, difficulties were encountered due to the differing features—faceted and enumerative, different structuring of the field as a consequence of differing purposes, differing levels of specificity, etc.

2 Compatibility between special classification systems SNDO and ICD is unidirectional from the former to the latter.

3 There seems to be overall correlation—though not conceptual—between the two Special Classification Systems in that a large majority of compound subjects dealing with cardiovascular diseases are represented in both the system.

4 The differential structuring of the two special classification systems gives rise to conceptual incompatibility as well as sequence incompatibility.

5 While SNDO is, generally speaking, in conformity with the Normative Principles, ICD is either in partial conformity or in non-conformity with most of them leading to compatibility problems between them.

6 It is not always true that Special Classification Systems do give a detailed breakdown of the field. This leads to conceptual and sequence incompatibility.

7 The general impression that classification systems designed by specialists would be helpful in organising information is questionable since different specialists to one and the same medical specialisation may arrive at different sequences which may be helpful only to the particular group or groups concerned.

In regard to compatibility between the University Classification System—Colon Classification—and Special Classification Systems—SNDO and ICD—, it was expected that there would be difficulty. This is because the general impression is that the Universal Classification System will not have the same degree of specificity as that of Special Classification Systems. But, the present investigation has shown a different finding. On the question of compatibility, it has been found that the Universal Classification System has an overall compatibility with only

one of the Special Classification Systems considered. The following are the observations/findings in regard to Concordance and Compatibility.

1 In establishing concordance between classification systems—Universal and Special—, some of the parameters to be considered are :

- (a) Features—enumerative, faceted—of the classification systems concerned;
- (b) Scope and structuring of the field concerned by the classification systems;
- (c) Size of vocabulary of the systems;
- (d) Level of specificity of the systems;
- (e) Extent of individualisation achieved; and
- (f) Co-extensiveness of the class numbers/code numbers.

2 A certain degree of Conceptual, Verbal and Sequence incompatibility exists between CC and SNDO which, however, does not affect translation or switching compatibility.

3 Conceptual, Verbal and Sequence incompatibility exists between CC and ICD which affects translation or switching compatibility;

4 As a consequence, while compatibility between CC and SNDO is bidirectional, it is unidirectional from CC to ICD.

5 The specificity achieved in classification systems which has an impact on compatibility among them, is observed to be greater in some Universal Classification System when compared to that of some Special Classification Systems.

7 CONCLUDING REMARKS

Compatibility among classification systems is at present of utmost significance and is being considered at the 'heart of the matter of modern classification"—insofar as the growing interdependence of information systems calls for better knowledge about the methods of establishment of compatibility, between classification systems, that is, methods, which facilitate the necessary cooperation of centers in their exchange of information and knowledge in general.

From the above presentation, it becomes clear that on the question of studying compatibility among classification systems. Ranganathan's Normative Principles have a very large potential.

It may be seen that classification systems which are in conformity with them (as Colon Classification and Standard Nomenclature for Diseases and Operations) will be largely compatible with each other. But, for some of the Normative Principles such as Canons of Mixed Base/Pure Base, Canons for Faceted/Non-faceted notation, Canons for Mnemonics, etc., most of the Normative Principles have an influence on compatibility. Therefore, they may be considered as Normative Principles for Compatibility.

Perhaps, it would be appropriate to quote Dahlberg (3) who while reviewing the study has commented "...As his method of investigation he selected the one of great teacher, the late S.R. Ranganathan, and showed by this not only that his "Normative Principles" could be applied successfully, but also that their application helps in understanding the quality of the chosen structures—in the systems investigated as well as in any system which is to be elaborated". She goes on to add "...has shown for the experts in information science—and especially for classification experts—which factors have to be stressed in the future elaboration and evaluation of classification systems and how the Normative Principles of Ranganathan should be understood and applied. By this, he has also contributed to the understanding to the value and usefulness of the work of Ranganathan...".

In addition, it may be mentioned that the "...application of Normative Principles to. Classification Systems will show weaknesses and strength of the systems and will help to recognise better the structures of their systems...it will surely help not only all those involved in editing, revising and applying these (medical) classification systems, but also all those who undertake similar studies on compatibility of such systems. This, then reaffirms the fundamentality of the Normative Principles of the General Theory of Classification.

Another aspect that needs to be stressed—and, perhaps, to be overemphasised—is that Classification System which are designed taking into consideration Ranganathan's Normative principles have a better chance of survival than others. This is because of the fact that the Normative Principles inject into the Classification Systems, so to say, the quality of self-perpetuation enabling them to adjust to the challenges of changing information environment. This has been amply demonstrated by Colon Classification (which has been in conformity with the Normative

Principles) in that it has been able to represent coextensively subjects of great extension (as an Universal Classification System" as well as of great intension (as a Special Depth Classification System). As a matter of fact, its performance has been as good as, if not better than Special Classification Systems like Standard Nomenclature for Diseases and Operations (SNDO), and International Classification of Diseases (ICD). In other words, Colon Classification—guided by the Normative Principles—has been able to serve both shelving and bibliographical purposes—thus, proving that the obsession about an apparent incompatibility between the attributes of Universal Classification Systems covering the whole or nearly the whole of the Universe of subjects *and* Special Classification Systems covering smaller chunks of the Universe of subjects is not valid.

At this point of time, it would be appropriate to conclude that "Ranganathan may be dead, but he *lives* through his works and contributions, especially, the Normative Principles—which include the all-pervading Five Laws of Library Science"

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2.16 Analytico-Synthetic Scheme of Classification: Its Impact and Relavance to Modern Theories of Library Classification

RANJANA VOHRA

The new methods of classification that have developed are chiefly associated with Dr Ranganathan. His main principle was, classification should be entirely synthetic. Synthesis is a term used to refer to the creation of compound subjects by combining simple elements. Analytico-synthetic scheme of classification recognises the fact that every relationship of a single element must be revealed for the eventual retrieval of information. This concept had far reaching effect on the development of modern classification. Principles laid down by Ranganathan pointed the way to the making of many new special classification schemes such as those designed by Barbara Kyle, Foskett, Vickery, Farradane and others. British C.R.G. stated emphatically that faceted classification should be the basis of I.R. systems. There are many methods and possibilities open to the modern special librarian or information officer who may take the benefit of a modern theory and use a faceted classification.

1 INTRODUCTION

Ranganathan has undoubtedly been one of the *luminaries* of library science and library classification. He has made a singular contribution to modernize and professionalize library science in India. His theories and concepts had a revolutionary impact on International classification theory. I belong to those generation of librarians who did not have the opportunity to meet Ranganathan in persons. But so much has been written and said about him that we relive the era of that period again. I respectfully pay tribute to this great personality who was not only a librarian but also a nationalist, who through his work carried the name of our country abroad.

He was also a missionary and through his sincerity and constant endeavours brought the name of our country in the international field. He was indeed unsurpassable.

Traditionally, classification has meant to be a process of division and sub-division, proceeding from general to particular. This led to a rigid set of classes and class relationships. However, there has been now a different approach to classification which utilizes the "scientific method" working from particular to general. The new, analytic types of classification are being developed keeping in view the fact that "every book is a complex creation composed of a larger number of related patterns which reflect the multidimensional nature of knowledge. The followers of analytic form of classification believe that it is vitally necessary to show every relationship of a single classification element.

The whole object of library classification is to secure an arrangement which will be useful to the readers. It is a process which involves the systematic grouping of books by subject and is designed to expedite the full use of knowledge stored by the library. Classification is a key to knowledge and is the basis of all order in handling literature and its record.

The purpose of this non-traditional classification is two-fold. First, to escape from the procedure of classifying something in one place only, and secondly to permit approach to information from any angle which may be pertinent.

11 Inadequacies of Existing General Classification Schemes

There are certain limitations of traditional library classification that discredits it as an adequate instrument for the subject interpretation of books. The first of these limitations is associated with the *property of linearity*. A classification that is linear must perforce be uni-dimensional. However, the relations among books are multi-dimensional and the classifier is compelled to select a single relationship from all the possible relationships which any given title may have. The second is that of *inconsistency of organization*, for no book classification can be made consistent throughout with respect to its principles of differentiation. In the words of J.H. Shera,

A book classification,...cannot be a continuous hierarchy of

progression from general to specific, but is a series of self-contained orders, loosely assembled into a kind of pseudo-hierarchy by a grand design.

Third, there is the limitation of inherent incompleteness, for, if a book classification is to provide for all knowledge, past, present and future, a classification scheme should be provided with infinite hospitality.

A library classification is a device for arranging material and for indexing it, so that the library user need not examine the whole collection in order to be sure he finds what he wants. Classes in a documentary classification cannot, from the nature of the material they contain, be mutually exclusive.

In the words of Ranganathan, "A classificatory language must be nimble enough to keep step with the field of knowledge. Its expectation of life is determined by the degree of its self-perpetuating quality; by the smallness of the dependence of the classifier on the classificationist, to seize the correct class numbers of the new formations."

A major advance towards possible solution to the problem of library classification came when Ranganathan developed the philosophic orientation of his Colon Scheme. He was successful in devising a system of completely interchangeable parts that; would admit of almost unlimited collection of related subjects or points of view.

2 RANGANATHAN'S IMPACT ON MODERN CONCEPT OF CLASSIFICATION

Eric de Grolier once remarked that Ranganathan has played a pioneering role because his Colon Classification is the first basically 'multi-dimensional' bibliographic classification which has ever been conceived. Without his work a great part of the movement of ideas which has manifested itself in recent years in the field of bibliographical classification would probably not have taken place. During the International Study Conference for Classification for Information Retrieval held at Dorking in 1957, Ranganathan stated:

The development of the discipline of library classification has

led us to replace the traditional enumerative classification by the analytico-synthetic classification needed to face the challenge of the infinite, evergrowing, and turbulent universe of knowledge embodied in micro documents.

Analytico-synthetic classification is a classification which represents a subject by analysing it into its fundamental constituents (isolates) and synthesizing a class number for the subject out of the isolate numbers linked by appropriate connecting digits. The scheme of an enumerative classification is essentially highly monolithic, one of class numbers; whereas in an analytico-synthetic scheme, we have several short schedules of isolate numbers.

There are certain fundamental ideas and goals that lie behind all Ranganathan's work in the classificatory field. He insisted that bibliographical classification should fully express in a class—mark the subject of a book and then to add a distinctive book mark thus individualising each book in the library. Through his Colon Classification scheme he produced an entirely synthetic system; in which every subject is recognized as consisting of a number of basic parts. CC lists the appropriate basic parts of isolates and are later organized into categories or facets, each category consisting of those concepts produced by a single characteristic of division. Most modern thought on the subject now accepts that the fundamental requirements of an information retrieval system, must be based primarily on the analysis of subjects into categories of elementary terms which can be combined as the literature requires.

21 Concept of Analytico-synthetic Scheme of Classification

By way of definition, an analyticosynthetic classification is a classification scheme which admits of facet analysis, provides rules for the arrangement of facets needs in diverse subjects, provides connecting symbols and admits of the synthesis of the Basic Class and the Isolate Numbers of a subject into its Class Number. The basic teaching of analytico-synthetic classification is that any compound subject, however complex can be broken down into its separate components, or facets and these be reorganized into a standard pattern by reference to a general 'decision-making model'. It is also known as *facet*

analysis' which consists in an analysis of a subject in its entirety 'into a certain number of facets or categories of things'. Dr Ranganathan used the term fundamental category in the sense that 'each facet of any subject, as well as each division of a facet, is considered as a manifestation of one of the five fundamental categories—Personality, Matter, Energy, Space and Time—thus ensuring a uniform sequence of the 'facets' under the various subjects.

However, B.C. Vickery did not agree with Ranganathan's five fundamental categories and he felt that 'for the field of science and technology' a longer list of fundamental categories has proved helpful;

Substance (product)

Organ

Constituent

Structure

Shape

Property

Object of action

Action

Operation

Process

Agent

Time

Any such list of fundamental categories is not to be used mechanically but as a provisional guide in approaching a new field. Ranganathan's solution to the problem of classifying was his Facet and Phase Analysis. He grouped his term in facets within traditional 'Main classes' and for each class laid down the sequence in which the facets were to be cited. There may not be an agreement on the number of categories but the use of categories for the grouping of terms has been accepted as an essential part of the organization of our ideas into coherent structures.

The growing influence of facet analysis reflects on its importance in the modern concept of library classification.

First the revised schedules or newly developed schemes of older general schemes have displayed some faceted structure.

Secondly, the method has been used in the construction of special schemes. Members of the classification Research Group are consulted by institutions needing new classifications, and a number of schemes have been commissioned this way.

And thirdly, facet analysis has offered a set of principles and techniques that have now been applied in a variety of subject fields, and these have been shown to be workable and useful and are of considerable value to the future designers of retrieval systems in special fields.

3 EMERGENCE OF FACETED SCHEMES OF CLASSIFICATION

The emergence of a number of special libraries and the absence of appropriate subject classifications gave the opportunity to test the modern theories of classification in the construction of special schemes and the experience that has been gained from the construction of such schemes has thrown much light on the *problems of notation*, helpful order and the arrangement of highly specific and complex documents. It has now become possible to classify accurately, through the faceted scheme many pamphlets or periodical articles with extreme specificity.

Ranganathan's views on Faceted Classification were carried to the realms of Western world by Palmer and Wells through their book "Fundamentals of Library Classification" in 1951. This brought a revolutionary change in the concept of Library Classification in the West and brought acclaim to the Indian thinker.

Faceted classification has now been accepted as a tremendous improvement on the principles employed by the classifications which are, at present, widely used. Librarians working in special libraries particularly are confronted with volume which deal with the interaction of subject disciplines, or have the impact of one subject upon an entirely different one. Modern theories of classification have tried to deal with such documents with the means of Ranganathan's phase analysis. Any new classifications which are coming into being tend to be faceted and adopt phase relationships. Although Colon was a pioneering scheme which introduced new methods, useful ideas and developments have been contributed in recent years by J. Mills,

D.J. Foskett, B.C. Vickery, (Miss) Barbara Kyle, J.L.L. Farradane, to mention a few.

31 *Classification Research Group*

In Great Britain the members of the Classification Research Group worked most proficiently to examine the foundations of the existing general scheme, to develop the newer principles laid down by Dr Ranganathan and to reexamine the role of notation finally to create completely faceted schemes for certain areas of knowledge.

The C.R.G. was initiated in 1952 and by 1955 it was convinced that a faceted classification should be the basis of what are 'information retrieval systems'.

A number of faceted schemes of classification have been compiled by members of the C.R.G.

- 1 British Catalogue of Music Classification by E.J. Coates.
- 2 Occupational Safety and Health Scheme by D.J. Foskett.
- 3 Diamod technology by J.E.L. Farradane.
- 4 Insurance by Pendleton.
- 5 Office Management by J. Mills.
- 6 Social Science by Barbara Kyle.
- 7 Soil Science by Vickery.
- 8 Engineering Industry by E.G. Brisch.
- 9 Scheme on Patent Literature by T.N. Ball.
- 10 Chemical Compounds by McColvin.
- 11 Classification for Rubber by Dawson.
- 12 English Electric Classification by English Electric Group in 1957 (Mrs) Aitchison.
- 13 Granfield Classification for Aeronautics and allied subjects by B.C. Vickery and Farradane.
- 14 Library science classification scheme.

311 *D.J. Foskett and His Special Scheme of Classification*

D.J. Foskett who is the author of several special faceted classification systems, was one of the first to introduce Ranganathan's ideas into England. His works and writings clearly indicate Ranganathan's influence on modern thought. One of the characteristics of Foskett's classification is that the *specific precedes the general and that the long numbers are classed before the short numbers*. According to Foskett, (I quote) "A

system of analysis for modern specialist literature needs a more complex base, which is able to specify many relations and to coordinate concepts in many ways. The classificationists are set about designing systems which will provide the required freedom and flexibility in concept coordination."

Foskett's *London Education Classification* is an example of a successful faceted classification. His scheme has been used in the library of the University of London Institute of Education since 1963, (the second edition of this was published in early 1974). The aim of LEC is to enable librarians to classify, as specifically as they wish, any subject that may appear in the literature of Education. The scheme is clearly based on modern theories of classification, in particular those of Dr Ranganathan and the CRG. It provides the elementary terms, arranged in facets, from which complex subjects may be assembled. There is no entry in the schedule for a whole subject such as '*The Teaching of Modern Languages in Primary Schools*', instead separate entries would be found for 'teaching', 'modern language', and 'primary school'. The scheme and its rules provide the terms and the method of assembling them so as to ensure consistency in classifying and accurate specification of even the most detailed topics. By this means, not only are most of the present problems in classifying overcome, but a much better tool is provided for reference service and information retrieval.

In LEC, facets are identified by capital letters, and terms in facets by lower case letters. Capital letters are not used on their own, but signify the beginning of a facet; small letters complete the identification of specific terms and are used with alternate vowels and consonants. The purpose is to make each notational symbol pronounceable.

Example:

Direct method of teaching foreign language in secondary modern schools:

School curriculum		Method
Secondary modern	French	Direct
Rid	Men	Lem

4 NOTATIONAL FLEXIBILITY ACHIEVED IN A FACETED CLASSIFICATION

The development of modern classificatory theory has led us to re-examine basic principles of notation. The *feasibility* of a notation is now judged by its ability to convey order, *revelation* of the hierarchy, indication of changes of facets and phase and flexibility.

Notations of faceted systems are in fact extremely flexible for they grow *in more than one ways*—faceted notation permits the extension of the symbols representing any of the isolates involved. Examples from the flexibility of a faceted notation are like—Space Isolate, Time Isolate, Phase Relations, etc. The number for Audio-Visual method of teaching algebra in elementary schools according to a faceted scheme would be T 15:3 (BZ), 1 (Colon Classification).

Keeping in view the growing complexity of knowledge, and of the consequent tendency of class numbers to lengthen the positive retention of order, and some shortening of notation is an important consideration.

The relations between terms may be identified (i) by sequence, (ii) by distinctive symbol, or (iii) by a combination of both. A facet indicator shows sequence of the facets, and also allows the use of the same symbols in several facets. In Class X, Economics of Ranganathan's Colon Classification, 8 (F 182) is Iron Industry belonging to the Personality facet, and the symbol 6 belonging to the energy facet means financing. Hence the energy facet indicator Colon is used where both the terms come. The number for Financing Iron Industry in India would be X8 (F182) : 6.44

Miss Barbara Kyle in her Classification for Social Sciences has divided it into two main facets, activities and personalities in which all activity terms have a capital letter notation and all personality terms a small letter notation. Either of them can take precedence in constructing a symbol for every subject according to the user's need. She also made use of the retroactive principles for subdividing one terms by terms from earlier facets. Retroactive method was introduced by E.J. Coates who stated that for a special subject in a faceted classification, if we can divide each facet by letters' coming later in the

alphabet, we can also divide later facets by earlier without making use of a facet indicator.

Modern trend is therefore, to seek symbolism, that has greater simplicity and at the same time flexible.

DK	Anthems
F	Choral works for female voices
FDK	Anthems for female voice

Foskett too does not make use of a facet indicator to introduce a new facet. In his scheme for Packaging, he has numbered the *facets consecutively* in a prescribed sequence.

Each facet is clearly indicated and terms in different facets cannot be confused.

In his scheme for *London School of Education*, he has made use of capital letters for facets and small for terms :

Tig	The slow learning child
Red	Adolescent
Lod	Audio-visual aids

Until recently it was taken for granted that a notation should be 'expressive'—i.e., it should reflect the structure of the classification scheme to which it is attached. However, it has become important that the notation should be able to express relations between subjects. All modern systems recognize the need for at least two distinctive symbols : (1) for the identification of individual terms, (2) for the identification of relationships between them. There is now a grouping of fields, sub-fields and topics and their inter-relations. The subjects are arranged in a network, not in a hierarchy.

5 SOME ASPECTS OF BASIC RESEARCH IN CLASSIFICATION

There is a need for investigating into the development of classificatory principles and techniques. The growth of general libraries, and particularly the expansion of their reader's advisory services, is placing a severe strain upon the older general classifications which are still very popular. This is similar to the difficulties which the special librarian has to

face in using conventional methods to organize such material as periodical articles, patents, and technical reports. The need for superior methods for the arrangement and control of literature in all types of library has acted as a great stimulus to research in classification. A different approach has been introduced, utilizing the scientific method and working from particular to general. The specific unit is accepted as the basic element of the system, and classes are formed by grouping units which are similar. The classification is created by building upwards, by putting individual parts together to form a whole (synthesis).

Jesse H. Shera, who belongs to that representative school of thought which suggests that library classification for shelf arrangement of books is now 'obsolete' has no utility and needs 'replacement', once wrote:

It will grow increasingly apparent, that if bibliographic organization is to attain its highest degree of efficiency, traditional library methods and techniques may largely be discarded in favour of an entirely new array of tools . . . indexes, subject bibliographies, annotations, abstracts, micro-photographic processes, mechanical sorters electronic devices, and combination of the foregoing.

With the above devices there will be a new concept of classification. Classification will have to be freed from the straight-jacket of the hierarchical order to endow it with new meaning, deeper significance and far greater potential utility.

51 Recommendations of a Series of Studies in Order that Progress Might be Made in Respect to Classification

- 1 A study of existing classifications, their weaknesses and virtues.
- 2 Development of new classification schemes with a re-examination of the principles upon which they might be based.
- 3 The content analysis of the research literature of varying fields for the identification of terminology and concepts currently in use.
- 4 The careful scrutiny of subject and headings in the light of such analysis.

5 The development of adequate techniques for measuring the effectiveness of all forms of classification.

6 Study of the dispersion and concentration of materials in varying schemes of classification, and the interpretation of the results of such findings in terms of utility to the library user.

6 CONCLUSION

The rapid growth in the number of special libraries and the absence of suitable classifications has provided the opportunity to test the newer theories of classification in the construction of special schemes and the experience gained had thrown much light on the problems of notation, helpful order and the arrangement of highly specific and complex documents. Some of the advantages claimed by the entirely faceted special scheme are that it is easier to compile than the traditional type of classification, that it helps to achieve precise classification; it is less bulky as each recurring concept is listed only once in the appropriate category, also many new themes which emerge simply involve scheme has already recognized and listed. This shows that a faceted scheme will not outdate as readily as the enumerative type: an important factor to be considered in libraries specializing in scientific and technical fields. Ranganathan summing up this point stated:

“that the Analytico-synthetic classification is needed for the turbulent universe of knowledge embodied in microdocuments

Some of the British libraries have claimed that the reader in a special library understands and appreciates the idea of synthesis in classification far more readily than the approach which tries to chart the whole subject field by listing every conceivable theme, J. Aitchison who constructed the English Electric Company's Faceted Classification for Engineering stated that despite certain faults in the synthetic scheme, its superiority and utility for a special library was clearly recognisable, by both staff and readers.

The newer principles have proved highly significant in docu-

mentation and information work. There are many methods and possibilities open to the modern special librarian or information officer who may take the benefit of a modern theory and use a faceted classification on the lines described, and if no suitable one is available, he may take over the task making one.

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SECTION 3

INDEXING MODELS

3.1 Chain Procedure and Precoordinate Indexing

SAKTI PADA DAS

Considers Chain Procedure as a first model of pre-coordinate indexing and highlights the emergence of chain procedure. Attempt has been made to pinpoint the main features. In the process, examines some aspects which reduce the efficacy of the system. Efforts to improve the system have led to research throughout the world, giving rise to various indexing system. Concludes that Ranganathan's concept of Facet analysis has left an indelible impact on other systems.

1 COORDINATE INDEXING

11 Pre-coordination

Since file searching is essentially a matching operation, the efficacy of an indexing system depends largely on the ways the constituent terms are pre-coordinated that will match majority of the approaches. It is widely recognised that pre-coordination of terms is necessary for effective organisation of a search file. Content representation of a document through concept-coordination in an alphabetical file intrinsic to any indexing system. Concepts are coordinated in order to delineate content of a document accurately with increasing specificity and to minimise the retrieval of irrelevant documents during a search. Coordination, in this context, is to establish harmonious relation of two or more concepts to generate a new concept in accordance with a set of principles and rules for sequencing the terms. "Coordinate indexing is, in essence, concept-coordination."¹ The coordination of concepts is done in two

stages (i.e. input and output stage). When concepts are coordinated in anticipation of readers approach, it is known as pre-coordinate model. Any indexing system adopting this model is called pre-coordinate indexing. The purpose of this paper is to consider Chain Procedure as a first model of pre-coordinate indexing and secondly, to highlight the genesis of Chain Procedure along with its deficiencies. Efforts to improve the system led to the emergence of several techniques.

12 Pre-coordination and Chain Indexing

Based on the pre-coordinate model, there are a number of indexing systems. They are Kaiser's Systematic Indexing,² Ranganathan's Chain Indexing,³ Farradane,⁴ Coates (used in British Technology Index)⁵, Sharp (SLIC indexing)⁶, Austin (PRECIS)⁷, and Bhattacharya-Neelameghan (POPSI)⁸.

The systems of indexing, mentioned above, have all come up along a particular line of thought. They have certain common features such as (a) Composite subject-heading composed of constituent elements, (b) fixed pre-determined citation order or significance formula for the components and network of references to a subject, to be accessed from all the constituent concept terms, simultaneously creating link to other related subjects.

Each system has, therefore, introduced its own indexing language for achieving the most preferred order of coordination of index terms and for expressing relationship between index terms. But it was Ranganathan who spearheaded this model and emphasised that "it is better to save the time of the reader at the output stage than to save the time of the staff at the input stage".⁹ Thus he achieved by Chain Indexing through his explicit use of a classificatory base i.e. Colon classification. The notable feature is his emphasis on class number. The Chain is nothing but a string of terms. The terms get organised or arranged in a particular sequence because of the classification scheme that chain adopts. The sequence of the terms is pre-coordinated.

The practice of stringing terms together in a phrase is, of course, not new. Traditional pre-coordinate systems have always concatenated adjectives and nouns, connecting directly as adjective noun, inverting them using commas or breaking

them with a dash. What is novel is the length and complexity of the phrases used in indexing and, more noteworthy, the fact that he has made explicit the rules used to construct these phrases.

As it is known, index languages have a semantics, a syntax and pragmatics. It would probably be correct to say that until recently the pragmatics and semantics absorbed most of the indexing systems. For instance, as rules of pragmatics there are Cutter's Principle of Specific Entry and his Usage Principle.¹⁰ Index language semantics are given in scope notes, definitions. Although some have given attention in the past to the syntactic aspects of indexing languages, Ranganathan formulated rules for sequencing index terms into phrases or strings. It was he who heralded this development. Chain Indexing, with its features of facet analysis and sequencing devices, is emblematic of modern string indexing languages and may be considered as a first model of pre-coordinate indexing.

2 CHAIN INDEXING

21 *Genesis*

"Many of the evaluation tests carried out on information retrieval systems have shown very clearly that specificity is essential if in informal retrieval system is to function at its optimum level"¹¹ Fundamental to this question of specificity, is the problem of sequencing of terms. These twin problems have been the major issues even today as they were during Cutter's time.

The growth and development of specific subject entry may be traced back to the nineteenth century when subject access to books was by means of classification which tended to be broad. Some complained that it was difficult to find a given title¹² In other words, the classified catalogue provided its users with high recall but wanting in precision i.e. lack of specificity. Crestadoro attempted to improve the precision of nineteenth century methods of subject control by developing "title-term" indexing.¹³ It was "natural language" indexing "using each—author's own definition of his book."¹⁴ This could not deliver the goods. But it was Cutter, who in developing his method of alphabetic subject indexing gave a "death blow" to nineteenth century title term indexing.¹⁵ He assumed that in subject

it was necessary to link synonymous names of a subject. The mechanism introduced by him was to maintain—a Subject Authority file. He regarded subjects as specifics and classes as broad.¹⁶ But he could not go far. He restricted this search for specificity only upto a point where the subject could be named. He could not recognise subjects which had no names or were not nameable.

Since then, the scene has also changed due to the complex and interdisciplinary nature of a document. The quantity of material has increased considerably. Emphasis has also shifted from books to various forms of micro-documents. As a result content representation can no longer be made by a single term or a phrase. Further the use of multiple term subject heading calls for the determination of an appropriate sequence. A break through was achieved by Kaiser and Ranganathan.

Kaiser's main concept was to find out a sound theoretical basis for fixing the sequence of terms. He used in a way some rudimentary ideas of classification through his classes of concrete and process. "This was completely a new direction when we recall the efforts of Cutter."¹⁷

But it was Ranganathan who contributed finding a theoretical base for subject-indexing based on sound theory of classification. Ranganathan mediated upon the rules of Cutter, the great genius in cataloguing, "to discover the basic principles implied in the preferred sequence of component headings in a multiple subject heading."¹⁸ His rules were tried but they were not sufficient.

Then he studied critically list of subject headings in the light of the few ideas got by the study of Cutter. He began to study how they arrived at the subject headings. There was no clue in the preface. After some work, he found that in 80 per cent of the cases the subject heading looked as if they were derived from Dewey Decimal Class numbers. In the remaining 20 per cent this was not so, Colon classification numbers were tried to arrive at the subject headings. These agreed in almost all the cases. This was the genesis of Colon procedure.

22 The Name Chain Procedure

"Chain Procedure is the name given to the procedure of deriving the name of a subject in the verbal plane from its class number in accordance with a set of rules. The first step in that

procedure is to pull out the class number into a chain and this is why the procedure was named Chain Procedure."¹⁹ Later on, it was called Chain Indexing.²⁰

23 Features

The distinctive feature of chain indexing is the explicit use of a classificatory base i.e. Colon Classification. The central ideas in this scheme are the concepts of Facets and Fundamental Categories. This may be considered as a two-step procedure. The first step is to analyse the concepts of a given subject into categories. These categories are called facets of the subject. The second step is to establish rules for combining or sequencing the terms into phrases. The first step, facet analysis, is semantic in nature. The second step, establishing rules for sequencing, is syntactic. The order of terms is determined by the facets to which these terms have been assigned. It becomes an automatic device and eliminates the initial time-consuming effort of analysis and subject formulation on the part of an indexer.

24 Deficiencies

Most of the criticisms levelled against chain indexing centre round on two points, namely, imposition of rigidity by the classification scheme and² the problem of disappearing chain.

24.1 Imposition of Rigidity of the Classification Scheme

The Chain indexing remains popular because of the advantage of mechanically forming subject heading from class number. Gradually some discomfiture was felt because of the complex nature of document to be indexed. Pin-pointed classification followed by specific subject heading obtained from the chain procedure could not deliver the goods as it was thought earlier. This is due to lack of adequate management system to keep the scheme up-to-date. It becomes incapable of giving digit by digit translation of class number which is a necessary concomitant for achieving specific subject heading. It may be mentioned that notation has its limitations. It works alright with macro subjects so long its length remains optimally efficient and effective. In the region of micro subjects the length of notation crosses its optimum size; and it becomes more a problem than a solution. The efficacy of the system has

reduced considerably. Realization of this fact, Ranganathan has demonstrated in 1954 that the chain indicating the full name of the subject of a document can be derived from an analysis of the subject of the document according to some clear cut rules.²¹ "The fact analysis of the Colon Classification does help to determine in a systematic way the subject of a document and word groups in the name of the subject and their sequence. It is reached by the time we arrive at step-5 in the systematic procedure for classifying. The numbering comes only afterwards. It is possible to get along without numbers. In other words, facet analysis is by itself sufficient for the verbal organization of subjects as it done in a dictionary catalogue without using class numbers."²²

242 Disappearing Chain

The second difficulty arises from the problem of disappearing chain. Out of all subject headings generated by the chain indexing, only one entry (i.e. last link) is specific and all the others stand for broader classes. To tackle this problem of disappearing chain, the general solution seems to be adoption of some kind of rotation of constituent terms of the heading—Instead of dropping the elements one by one to the very root, rotation of the elements would keep all the headings complete. But this will take away all the advantages of economy, simple mechanical rendering of headings, and the simultaneous provision of both specific and generic searches of any subject.

3 IMPACT

In spite of the disadvantages cited above, modifications have been proposed to put an end to all criticism against disappearing chain and make the system more effective. With a view to show this problem, several new techniques have been devised by Farradane, Coates, Sharp, Austin and Bhattacharya-Neelameghan. The necessity of composit subject heading composed of constituent terms, and a citation order/significance formula has been accepted by all. The net-working of references has also been emphasized keeping in view the economy of file and mechanical way of rotation. All of them accepted the concept of Facet analysis, propounded by Ranganathan. But each of them has developed a theoretical basis for the sequencing of

component terms of a composite subject.

31 Farradane's Approach

J.E. Farradane suggested a different method of providing rules of syntax in an indexing language. He shifted the emphasis from the attributes of component terms to the existing relation between each pair of terms. The relationship of concept-terms is indicated by symbols or 'operators'. He has detected nine different kinds of relation for which he has provided symbolic indicators.

32 Coates's Approach

Coates has given one of the finest exposition of subject indexing. He has put it into practice in the *British Technology Index* (BTI).²³ He accepts the basic logic behind Kaiser's dual category of Concrete and Process. He renames these categories as Thing and Action and explains how other idea categories can be analysed and fitted into this primacy structure.

It may be emphasised that Coates approach, used in BTI, is basically a modified version of chain procedure. In it he has used composite subject composed of constituent terms and used significance formula—Thing, Part, Material, Property, Action. Further the second aspect of chain procedure, i.e. network of reference headings are generated from the chain keeping in view the maximum approach points with minimum number of entries.

33 Sharp : SLIC Indexing

Sharp has devised a new system of deriving additional headings in an economical way, which has been named the SLIC index (Selective Listing in Combination). He rules out permutation of terms. His method is entirely on the combination of terms irrespective of the citation order. On the basis of formula, given by Sharp, the calculation of all combination and accepted combination in SLIC indexing has been compared with chain indexing. The result has not been found economical.²⁴

34 PRECIS (Preserved Context Indexing System)

Precis has grown out of necessity of fuller subject specification of a document. As is well known, the British National Bibliography (BNB) was using for quite some time chain procedure

derived from Dewey Decimal number for the preparation of alphabetical index to the classified part. But it was felt that the class numbers were really not able to represent fully the content of a document. Like all indexing language, PRECIS, too, has developed a theoretical basis for the ordering of component terms of a composite subject. They are role indicators. The assignment of role indicators to index terms achieves the same purpose as grouping terms into facets. Hence there is implicit faceting in PRECIS language.

35 POPSI (Postulate-Based Permuted Subject Index Bhattacharyya and Neelamegham⁹⁵ has advanced significant proposal towards solving the problem of disappearing chain. They suggested a simple system of rotation of component terms without disturbing the original syntactical structure of terms in the chain. This solves the problem of disappearing chain. Encouraged by the result some further modification have been proposed. It may be pointed out that POPSI is not based on any scheme of classification but uses the ideas and theory of classification both in analysis of subjects and in the structuring of the names of subjects.

4 CONCLUSION

Ranganathan with his powerful analytical mind supported by a scientific training in modern mathematics invented and designed Chain Procedure based on his Colon Classification. He realised that the concept of chain is intrinsic in the search formulation of a user. Chain Procedure stands on this basic concept of chain which is more or less in one form or other conceived by all indexing systems, cited above. His concepts of chain and facet analysis are discernible in all the systems that have come up along the same line of thought.

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3.2 Chain Procedure : The First Model of Pre-Coordinate Indexing

A. TEJOMURTY

Discusses the importance of subject analysis and the functions of an index. Makes an evaluative study of chain procedure. Deals with the attempts to remove proplems of chain procedure, viz., citation order, and the disappearing chain. Modifications like rotation of terms are analysed. Makes a detailed study of the working of POPSI, model of Coates, and PRECIS vis-a-vis chain procedure. Strikes out the similarities among pre-coordinate indexing models, and pinpoints the influence of chain procedure on other pre-coordinate indexing models.

1 PROLOGUE

The main interest of a user in any subject access information system is to know two things. One is the names of the subjects, and the other is the relationship between those subjects. While this necessity produces lists of subject headings in the dictionary catalogue, it produces, in the classified catalogue, a systematic classification and an accompanying alphabetical subject index. When indexing is considered as a method of document representation, it follows that indexing has to specifically represent the content of documents. Indexing can be looked at as the reverse process of the creation of the text by an author. The author starts with ideas, topics and concepts, and logically arranges them in words, sentences and paragraphs, which take the form of a document. The indexer/classifier, on the other hand, starts with the text and breaks the same into pre-determined concepts, topics, etc., to be used in the index file. Two important functions are performed by an index. One, it translates natural language terms into classification notation, and two, it brings together under a single

term, the various aspects of that term that have been scattered among different parts of the same main class or different main classes in the scheme of classification.

A thumb-nail sketch of the initial developments of subject indexing concepts, would automatically pin-point the names of Cutter (*Rules for a Dictionary Catalogue*, 1876), and Kaiser (*Systematic Indexing*, 1911) for their explicit principles and clear formulations regarding indexing techniques.

2 CHAIN PROCEDURE

Chain indexing, originally called chain procedure, is indeed a classic contribution of Ranganathan. Ranganathan's search for solutions to the problems of subject headings, and the results of his extensive research for a more coherent subject analysis were embodied in his *Classified Catalogue Code* (1934), and *Theory of Library Catalogue* (1938). Ranganathan, the classificationist and library scientist he was, established for the first time a logical correlation between classification and cataloguing. This relationship, called as symbiosis, produced chain indexing. Ranganathan's postulational approach to subject analysis combined with the concepts of facets and fundamental categories provided a rigorous framework, for the development of classification schemes in the beginning and for alphabetical indexing later on. Ranganathan's chain procedure provided the vital link between classification and alphabetical subject indexing, and also proved that since alphabetical indexes displayed a hidden classification in their cross referencing patterns, they could well be based on a scheme of classification. The fair trial given to chain indexing by the British National Bibliography until 1970, and the continuous developmental research carried out at the DRTC have added new dimensions to it.

21 Working of Chain Procedure

Chain procedure bases itself on the analysis of the classification symbol of each subject, for the derivation of the required subject index entries for a classified catalogue code. This is a semi-mechanical procedure to derive subject word entries from the artificial language of classification to the natural language. The class number of a subject is

transcribed in a unidimensional form (though the class number might represent a multidimensional subject), and is written from left to right, i.e. moves from concrete to abstract. It is to be noted here that, not all the concept terms corresponding to the digits in the class number, but only those terms which are necessary to reveal the correct context, are to be mentioned. In essence, each index entry created by chain procedure is simply a statement in reverse of the elements that comprise the class number for a particular document. The chain procedure derives subject index entries by a procedure of elimination of one link of the chain at a time, moving from right to left, i.e. from abstract to concrete. This is called reverse rendering.

A chain index is a direct and specific index based on the extracted vocabulary of a classification system retaining all necessary context but deleting all unnecessary context. Two basic and preliminary rules of chain procedure are: (a) Construct the main heading by using the last term in the chain, qualifying it by such other terms from the superordinate links in the chain as are necessary; and (b) Make reference to it from the next superordinate link in the chain and make reference to that link from its superior, and so on, thus constructing a chain of references modulating one step at a time. Ranganathan's chain procedure is a very economical method in that it requires the minimum number of cross-references, yet makes sure that readers will find an entry point under every significant term in a composite heading. The characteristic feature of a chain index is that it indexes all significant steps in the chain. In this method the whole chain of classes is displayed in the index, and the user is led to the correct classification area. To set against this is the disadvantage that only the first is specific; the others do not lead us to the full heading that has been used. Coates¹ opines "Chain procedure indexing, reflecting the modulated structure of the classification scheme, tends to represent complex ideas by means of elementary combined terms, rather than by single complex terms: because of this, the coverage of subject relationship signalled by a classified catalogue supported by collation of terms in the chain procedure index is probably greater than that produced by an alternative method of indexing".

Though for the first time the use of chain procedure was experimented according to the Dewey Decimal Classification,

later on Ranganathan proved that it could work, and work well, with Colon Classification. In fact, now it is realized that chain procedure could be equally applicable to any scheme of classification

22 Removal of Problems of Chain Procedure

221 Citation Order

One main problem of chain procedure is the citation order of the index entries. Generally speaking, the searcher has as his/her starting point, the term representing a more concrete idea among the group of words in a compound heading. In majority of the cases, in Colon Classification, the more abstract idea is represented as the last link in a class number, with the result, it becomes the first specific subject heading. That is, while the searcher has the approach 'concrete to abstract', the chain index moves from 'abstract to concrete'. For example, the class number L45 421.6 will get the following index entries

TREATMENT, TB, DISEASE, LUNGS, MEDICINE
TB, DISEASE, LUNGS, MEDICINE
DISEASE, LUNGS, MEDICINE
LUNGS, MEDICINE
MEDICINE

The specific subject formulations like "Medicine, Lungs, TB, Treatment" or "Lungs, TB, Treatment" are not available in that order

This problem of citation order could well be removed by 'Forward Rendering' which Ranganathan² suggested in 1964. Accordingly, the specific subject heading for the above example would be:

MEDICINE, LUNGS, DISEASE, TB, TREATMENT

In this heading the constituent elements are in concrete to abstract and general to specific order.

222 Disappearing Chain

The main disadvantage and a persistent criticism of chain

procedure is that of the disappearing chain. Only the last link of the chain produces an entry which is coextensive with the subject of the document.

The Cranefield indexers have devised the multiple entry system, in which multiple entries are made by a cyclical permutation of the facets of the subject. For, examples, in UDC, "Statistics applied to agriculture" would get the class numbers

31 : 63 and
63 : 31

The chain is prepared for each separate facet and not for the whole class number as in the conventional chain procedure. The difficulty is that rotation of facets is not possible in all classification schemes, positively not in Colon Classification.

223 *Rotation of Terms*

When rotation of facets is not permissible, rotation of terms may be done. This modification to chain procedure was suggested by Foskett. This is called cyclic or permuted indexing. Taking the same example mentioned in section 221 we get the first CIE

TREATMENT, TB, DISEASE, LUNGS, MEDICINE

By rotating the terms we get the additional CIEs for this:

TB, DISEASE, LUNGS, MEDICINE, TREATMENT
DISEASE LUNGS, MEDICINE, TREATMENT, TB
LUNGS, MEDICINE, TREATMENT, TB, DISEASE
MEDICINE, TREATMENT, TB, DISEASE, LUNGS

The same procedure has to be adopted for each class index entry. This definitely means the preparation of additional entries as against the traditional chain procedure. The greatest advantage of this modification is that every entry is complete. Besides, the subject index entries are very slim (one line each), and hence may not prove very laborious.

3 PRE-COORDINATE AND POST-COORDINATE SYSTEMS

Traditional systems for the retrieval of documents on a subject basis—those using classification schemes, the classified cata-

logue and the alphabetical catalogue—can be considered as pre-coordinate. That is, they coordinate terms to form compound classes at the input or the indexing stage. The subject of documents are expressed through the synthesis of index terms or class numbers. One common feature of pre-coordinate indexing systems is that a compound subject is analysed into its constituent parts according to a plan, and then, these constituent parts are represented by symbols or words. After this, the various components are synthesised in an order. The modern approach is to list only simple subjects and give the indexer the chance to combine these elements at will, so that he can insert a composite subject into the system whenever it arises. In other words, the possibility of coordination of terms at the output or search stage is made available. Systems using this method are usually called as coordinate systems, but more appropriately known as post-coordinate indexes or manipulative indexes. After the 1950s, different varieties of post-coordinate indexing techniques were designed and developed, also bringing with them a change in the physical format of these index, i.e. from the good old index cards to edge-notched cards, batten cards and so on. Permuted indexes like KWIC, KWAC, and KWOC became possible and easy with the advent of computers. The developments in post-coordinate indexing system did not overlook the need for restrengthening pre-coordinate models. Chain procedure, POPSI, PRECIS, and the indexing model of Coates have all received increasing attention.

The exact point of balance (alphabetical index entries) in different libraries and indexing services will depend on their particular circumstances. They are now able to choose from the variations on a theme worked out by such practitioners as Ranganathan, whose economical chain indexing was used for twenty years by the BNB; Eric Coates, who developed a modification of chain procedure for the alphabetically arranged headings in British Technology Index; Derek Austin, whose PRECIS has replaced chain indexing in the BNB; and John Sharp, who described his SLIC system in *Some Fundamentals of Information Retrieval*.

4 CHAIN PROCEDURE AND BRITISH TECHNOLOGY INDEX

It is true that chain procedure attached to a scheme of classification gives better results. But it is to be noted that for the application of the chain procedure, a class number is not essential, nor is chain procedure totally dependent on a scheme of classification. The bonds of chain procedure and a scheme of classification were loosened successfully by Coates³ whose approach was used by the British Technology Index for deriving subject headings.

The most significant terms in a compound, according to Coates, is the one which is readily available to the enquirer's memory. An action of activity can be visualised only with a thing or material involved in the action. Coates evolved categories like Things, Materials, Actions and Properties. This gives us a clue to think that Coates has drawn from the theories of Ranganathan. Coates recommended the citation of terms in a compound subject as : Things—Action—Properties. He called this order as significant order. Twenty different kinds of syntactical relationships between terms were developed by Coates. The work of Vickery and Mills, who propounded similar citation order as that of Coates, could be seen as a clear influence on the development of syntactical rules of *PRECIS*.

5 POSTULATE-BASED PERMUTED SUBJECT INDEXING (POPSI)

Attempts to modify chain procedure, and research in DRTC have yielded a new indexing system called POPSI. First formulated in 1969 by Bhattacharyya and Neelameghan, POPSI claims to be amenable for both dictionary and classified systems. As per its name, POPSI bases itself on a set of general postulates considered to be part of a general theory of indexing language, and uses the postulates of the general theory of library classification. The formulation of subject headings, the derivation of subject index entries, and the determination of the subject of reader's query are possible in POPSI. According to the modified version of POPSI⁴, the main steps are :

Step 1 : *Verbal representation.* Derivation of the postulate-based verbal subject representation.

- Step 2 : *Display of components*. Determination of the pattern of display/rendering of all the components of the verbal representation.
- Step 3 : *Short display*. Determination of necessary component terms to be used for specific purposes.
- Step 4 : *Approach term*. Determination of component ideas, the names of which are likely to be used as "approach terms" by readers in their search.
- Step 5 : *Subject index entries derivation*. Choice of the method of deriving subject index entries so as to provide for facility of search by the approach terms.
- Step 6 : *Display of subject index entry*. Choice of method for display of each subject index entry derived by the procedure selected at step five.
- Step 7 : *Cross reference*. Determination of the pattern for subject cross referencing in the alphabetical subject index.
- Step 8 : *Alphabetical arrangement of entries*. Arrangement of the subject index entries and subject cross reference index entries in alphabetical sequence in a single file

If the specific subject of a document to be indexed is "Treatment of lung diseases in children" it can be represented as :

Medicine—(Specials) Children, Human body>Respiratory system—Lung : Disease—Tuberculosis: Treatment.

The general subject entries could be either prepared in the above format, with the relational signs (where>denotes a hierarchical or inclusion relation), or in the following two-line format.

Treatment

Medicine—(Specials) Children, Lung : Disease—TB : Treatment.

Tuberculosis

Medicine—(Specials) Children, Lung : Disease—TB : Treatment, and so on.

51 Chain Procedure and POPSI

The above brief description of POPSI makes it clear that

POPSI overcomes the problem of disappearing chain attributed to chain procedure. Every POPSI entry is a complete statement of the specific subject, only the approach to each entry in the catalogue is different. POPSI depends on word order and relational signs. The order of word elements in the chain is predetermined and fixed according to the sets of postulates, categories, or relational operators. Guha⁵ writes, "POPSI, it may have been observed, is not based upon any scheme of classification but uses the ideas and theory of classification both in the analysis of subjects and also in the structuring of the names of subjects. Detaching the subject analysis part from the apron-string of a scheme of classification has immensely increased the possibilities of deeper analysis and also analysis for different purposes". POPSI adopts the general postulates of classification theory that are useful in the development of special schemes of classification, to provide the basis for a general methodology for devising an index language. POPSI now claims to be an effective and efficient version of chain procedure suitable for a dictionary catalogue system.

52 Revised POPSI Version

A recent modification of POPSI has come from Bhattacharyya⁶. This can be studied under three heads : Analysis, synthesis and Permutation.

521 Analysis

In the revised version of POPSI, Bhattacharyya has provided a set of Elementary Categories. They are :

- D=Discipline (i.e. a field of study, e.g. Library Science);
- E=Entity (i.e. a concept or a percept, e.g. Light, Industry)
- A=Action (i.e. manifestation or function, e.g. Evaluation);
- P=Property (i.e. attribute or a characteristic, e.g. Power).

Modifiers, if any, are identified. Modifier refers to an idea used to qualify the manifestation, e.g. Flowering in Flowering Plant. Modifier could be common modifiers such as place, environment, time (all entry-based); form modifiers (property-based); and special modifiers.

522 *Synthesis*

The categories, modifiers, phase relations etc are represented by the indicator digits. Analysis and synthesis of subject propositions are to be largely guided by the notational table provided. The modifiers are formed into subject strings.

<i>Category modifier</i>	<i>Represented by indicator digit</i>
Form modifier	0
General treatment	1
Phase relation	2
Common modifiers:	
Time	3
Environment	4*
Place	5
Entity	6
Discipline	7 (usually 7 omitted)
Action	.1
Property	.2

Take for example the subject "Radiotherapy of lung cancer". This could be analysed as :

D = Medicine (Implicit)
E = Lung (Explicit)
P of E = Cancer (Explicit)
A on P = Radiotherapy (Explicit)

By synthesising these, we get the subject formulation as :

MEDICINE 6 HUMAN BEING, RESPIRATORY SYSTEM, LUNG
6.2 DISEASE, CANCER, CARCINOMA 6.2.1 TREATMENT, RADIO-
THERAPY

523 *Permutation*

This consists of permuting each term of the subject string as access point and repeating the full string below it to provide context to the permuted term. By taking the above example,

we can have an index entry as :

Radiotherapy :

**MEDICINE 6 HUMAN BEING, RESPIRATORY SYSTEM, LUNG
6.2 DISEASE, CANCER, CARCINOMA 6. 2. 1 TREATMENT, RADI-
OTHERAPY,**

6 PRESERVED CONTEXT INDEXING SYSTEM (PRECIS)

Between 1950 and 1970, the BNB adopted the chain procedure to prepare the class index entries to the classified part. All these years the BNB had attempted to overcome the difficulty of the absence of steps of division in BC, by verbal extension method. The cooperative production and use of MARC tapes, and the responsibility of the BNB to prepare the input for MARC. Project have resulted in a reassessment of their classification and indexing procedures. The need was felt for a system which could be manipulated by machine to generate subject index entries and feature headings. In 1971 PRECIS was developed by Derek Austin, and since then the BNB replaced the chain indexing by PRECIS. The first step in PRECIS will be to analyse the basic concepts representing the subject of the document. These concepts will then be translated into terms acceptable for the index through the use of two vocabularies, one covering the Entities, and the other Attributes. The vocabulary terms are hierarchically organised, and selected relevant terms will be cited in a predetermined order, preference being given to Entity. The relationships between elements in the compound will be made explicit by the use of Role Operators. Once the accepted terms have been cited in their correct order and operators added, the whole will be coded for machine manipulation.

Take for example the subject "The assessment to university students in Madhya Pradesh". This can be analysed as :

(O) Madhya Pradesh (I) Universities (P) Students (2) Assessment where (O) is Location (environment), (I) is key system, (P) is Part of the key system, and (2) is Action.

A string for the above example can be constructed as :

Madhya Pradesh—Universities—Students—Assessment.

It may be noted here that the terms of the string have been set down in a context-dependent order, and they form what we call a one-to-one-related sequence, that is, each term is directly related to the next term in the string.

61 *PRECIS format*

PRECIS adopts a simple two-line, three-part format. This is shown below :

LEAD

DISPLAY

QUALIFIER

The generation of the entries is done by the principle of shunting. The string of the above example can be depicted as :

LEAD

QUALIFIER

Madhya Pradesh. Universities. Students. Assessment.

By shunting the first term of display to the Lead position each time repeatedly, we get the entries :

Madhya Pradesh

Universities. Students. Assessment

Universities. Madhya Pradesh

Students. Assessment

Students. Universities. Madhya Pradesh

Assessment

Assessment. Students. Universities. Madhya Pradesh

62 *PRECIS and Chain Procedure*

The failure of chain indexing arise mainly from an inherited over-emphasis on generic relationships encouraged by the careless use of the term 'chain'. Mineur⁷ has suggested that symbols could be used to represent relations between terms for the chain index to emphasise relations and prevent ambiguity. PRECIS allows a user to enter an alphabetical subject index at any one of the significant terms which together make up a compound statement, and establish at that point, the full context in which his/her chosen term has been considered by the author.

While chain indexing eliminates one term in its entries,

PRECIS includes all the elements in a compound in each index entry, i.e. the full compound is indexed at each step. For example, the subject "Assessment of University Students in Madhya Pradesh" will get index entries in PRECIS as :

Madhya pradesh . . .
Universities . . .
Students . . .
Assessment . . .

The same subject will get index entries by chain procedure as

Madhya Pradesh. Assessment. Students. Universities.
Assessment. Students. Universities.
Students. Universities.
Universities.

Both chain indexing and PRECIS force the reader to scan sequentially a set of index entries in order to make sure that no relevant compound is missed. However, the PRECIS index gives more information than a chain index and serves as a basis for selection before the classified file is consulted. It can be clearly seen here that PRECIS overcomes the main problems of chain procedure, viz., citation order and disappearing chain. In fact PRECIS has been sometimes referred to as a rotated index. The success of PRECIS will, however, depend on the adequacy of the vocabularies of terms and the analysis of the relationships between them-- both generic and compound. While the main disadvantages of chain procedure arise because of the economy of order and concept, the disadvantages of PRECIS arise because of the absence of connection of the indexing system to any classification scheme.

7 EPILOGUE

The work in the indexing area for the last five decades or so has witnessed a shift from 'chain' to 'string'. Throughout this search for new indexing models the basic methodology has almost remained the same, though of course, the aim has been to make improvements in every successive model. Some common features of pre-coordinate index models, and Ranganathan's

influence on other models could be observed. They are :

(a) Facet analysis constitutes the major basis of all pre-coordinate indexes. Ranganathan's postulational approach, facet sequence, and fundamental categories provided a framework for alphabetical indexing.

(b) POPSI can be seen, and is considered, as a modified and refined version of chain procedure.

(c) A striking similarity could be seen between Ranganathan's fundamental categories and the categories developed by Coates. Even the Role Operators of PRECIS seem to be the same as Ranganathan's categories. Though the concept of Five Fundamental Categories has been criticised severely, the principle of Facet Sequence and the citation order of Ranganathan constitute the base for the syntactical rules of indexing.

(d) Facet analysis results in the formation of a chain or string. In fact string can be taken as a new name of chain, the basic methodology behind the two being almost the same, except of course, with certain refinement like 'rotation of terms' and so on. Rajan⁸ writes, "The formation of string is the final end product that results from the exercise of facet analysis, using any of the postulates and principles and this becomes, subsequently, the raw material for the manipulation of the further entries, depending upon syntactic rules of the particular model. Chain and string formation is very much a human intellectual operation in most index models, the computer coming in only for the manipulation of the entries, providing for different approaches "

(e) The syntactical structure of PRECIS depends upon 'context dependency'. Ranganathan's freely faceted structure is also based on context dependency.

The disadvantages of chain procedure gave rise to other pre-coordinate indexing systems like Cyclic Indexing, Rotation of Terms, POPSI, PRECIS etc. All these refined models have not succeeded in relegating chain procedure to total oblivion, in that they have not added anything new or very significant to what Ranganathan has already propounded in his chain procedure. Chain procedure depends on a scheme of classification in that index entries are derived from the class number, which itself is dependent on postulates. PRECIS has a limited and an indirect postulational approach. Thus, chain procedure could

be seen as the first model of pre-coordinate indexing, and its influence on other indexing systems could be visualized in its proper perspective.

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3.3 Chain Procedure and Its Influence on other Pre-Coordinate Indexing Systems

KAMLESH VINAYAK and K.K. TANEJA

Subject cataloguing was attempted by Cutter in 1876 but the first systematic foundation of subject indexing was laid by Ranganathan. In his scheme, all the terms are fitted into a set of categories arranged in order of significance which primarily form a basis for construction of the Colon Class Number. For deriving these component terms for the purpose of subject cataloguing he devised mechanical procedure based on scientific principles named as chain procedure. Later on the need for mechanization of indexing was felt and it resulted in development of POPSI and PRECIS system. POPSI employs cyclic permutation of terms and some eight different steps. PRECIS has codes denoting role operator, differencing operator and context dependency. The basic principle behind both these procedure is, of course, the chain procedure developed by Ranganathan.

1 INTRODUCTION

Communication is a process of exchanging the information content of a message between the generator of information and the recipient. Besides oral and other media, communication is effected through the conventional printed media like books, journals, etc. After the Second World War, a sudden growth in literature has resulted in an exponential increase of information published in different media like journals, monographs, etc.

Owing to spread of education and the increase in research activity in new research projects—both pure and applied, undertaken by individuals and teams, the number of users of information has also increased phenomenally.

The size of literature, the different media, the forms in which they are communicated and the number of people involved in process have also increased. As an example, let us take the case

of publication of periodicals only. There are about 48,000 scientific journals which produce a total of two million articles a year.¹

2 NEED FOR SPECIFIC SUBJECT

The increasing demand for quicker dissemination of information contained in a variety of recent forms of information media has resulted in the designing of various indexing and abstracting techniques. More and more emphasis is on specific information for a variety of reasons and use. The effectiveness of a retrieval system depends largely upon the size and composition of the document classes existing in the system and upon which classes are consulted when a research is undertaken. Generally, if we create large classes we achieve high recall : but higher precision levels become increasingly difficult to achieve.

In other words the larger the classes the easier it is to retrieve all the documents on a particular topic but the more difficult it is to retrieve only the relevant ones. If the classes are very small we would be able to retrieve easily only the relevant documents, but we may find it difficult to conduct a comprehensive search. More emphasis on specificity of information implies that we must exercise some control over indexing operation, rather than giving each indexer an autonomy to create new classes indiscriminately which would result in many overlapping classes. Therefore, it is very important that in the indexing operation documents be assigned to classes according to some constituent pattern for which the chain procedure provides a scientific basis.

3 DEVELOPMENT OF INDEXING CONCEPT

Originally the concept of indexing had been concerned with book indexes primarily to show where exactly in the text a particular concept is mentioned, referred to, or defined in any way. With the passage of time, as these indexes became more and more specific, the need for more specific headings for topics was felt and sub-headings were used for specific content. This device resulted in what we today call Relative Index to

Decimal Classification devised by Melvil Dewey. The idea of Relative Index was further refined by Ranganathan and others by using devices of inversion, punctuation, indention and abbreviations, etc. In the index to the Classified Catalogue Code Ed. 5 and many other books, Ranganathan has made use of these devices of inversion, punctuations and abbreviations e.g. def., irt, desc to explain the different context such as definition, in relation to, described. These thoughts of Ranganathan had their influence on the further development in indexing techniques.

4 PRE/POST CO-ORDINATE INDEXING

Indexes have been categorized as pre and post co-ordinate. For persons requiring information on a specific topic, the access through subject is essential. The catalogue, source of information, index etc. reveal all available documents on a given subject. When concepts are combined or co-ordinated to form complex subjects, such co-ordination when carried out by the indexer is referred to as pre-coordinate indexing. Pre co-ordinate indexing does not provide any facility for manipulation of classes in searching. Searches are restricted by class relationships built into index language itself. Pre co ordinate indexing systems are either fully enumerative or partially enumerative and partially synthetic. Pre co-ordinate indexing includes classified catalogue, chain procedure, key word indexing, alphabetical subject catalogues, subject-headings used in L.C. Dictionary Catalogue, Alphabetico-Classed Catalogue and POPSI.

41 *Post Co-ordinate Indexing*

In pre co-ordinate indexing the co-relation of the words in the headings are taken selectively. In post co-ordinate indexes co-relation is performed at the time of search; hence the name post co-ordinate.

Not all post co-ordinate indexes are computerised. Though there are systems, like punch cards and edge-notched systems that use optical coincidence cards yet most commonly encountered forms of post-coordinate indexes are computerised; and computerised indexes are post co-ordinated.

42 Characterisation of Indexes

The basic criteria for indexes provides a scheme for characterising by (a) search, (b) arrangement, (c) heading and (d) by access points or structure. The introductory sentence "Indexes must respond to search objectives" (*Basic criteria for indexes* : ANSI, 1968)² describes three kinds of searches, syntactical analytical and hierarchical.

43 Contribution to Indexing

The year 1876 and the name of Charles Ammi Cutter mark a turning point in the history of subject cataloguing. In that year the first edition of his Rules and Comments appeared wherein Cutter virtually laid the foundations of subject cataloguing for the next three quarters of a century and his prescriptions were accepted generally. Though the indexing technique was used by Dewey for preparing relative index to Dewey Decimal Scheme of Classification yet he had no idea of the algorithm behind this indexing system. He merely justified it as an economic measure and no set of rules were given. Cutter almost lost his way in trying to find an order of significance in subject headings with adjectives and double noun phrases.³

Later scientists namely Kaiser, Faradane and Ranganathan made efforts towards the development of indexing language which have been well appreciated. J. Kaiser in 1911 published his systematic indexing which took the practice of *alphabetical subject indexing* an important step forward. Kaiser's primary concern was to find a sound theoretical basis for fixing the sequence of forms in the headings. Two classes—one concrete and the other process—were comprehended under the given concept.⁴ The class concrete included things, places and abstract terms not denoting any action or process. The concrete element was to be the entry in all cases. The class process meant an action represented by mode of treatment of the subject by the writer, action described in the document and an adjective related to concrete as complement to the subject. In case of locality-topic combinations, he also suggested double entry, i.e. both entry under the concrete class and the locality. However, he did not rule out the inclusion of adjectival and double noun phrases but he emphasised the use of terms or words in preference to phrases.

Coates observes that Kaiser attempted to derive subject heading order from the character of individual terms in isolation rather than their mutual relationship in the phrase. He, therefore, took up the problem of relative importance of components of a compound subject at the point Cutter had left it. According to Faradane time sense and awareness of degree of distinctness are possible ways in which concepts are related. These relationships are represented by a sign consisting of the parts termed as "Operators". He advocated that categories of Ranganathan and Kaiser's pairs are superficial manifestations of modes of relationships between pairs of terms and might be treated as an instance of causation relationship. Kaiser's pairs to determine the order of significance of various terms may be helpful in case.

In earlier days when structures of the different subjects were linear, the Kaiser's pairs may be helpful and sufficient to determine the order of significance of different components of subject. But the explosion of knowledge and multi-dimensional and interdisciplinary growth of different subjects have resulted in compound and complex subjects. It has not been possible to fit all the components into the pair recommended by the Kaiser to achieve helpful order of significance of these components. Ranganathan tried to overcome this difficulty by recommending five fundamental categories (Personality, Matter, Energy, Space and Time).

5 CHAIN INDEXING

An evolutionary attempt in this direction has been made by Ranganathan by fitting all terms into a set of categories arranged in order of significance which primarily forms a basis for construction of the colon classification scheme. The proposed order of significance is the crux of determining the order of component terms both in dictionary catalogue subject heading and classified index entries. For deriving these component terms for the purpose of subject catalogue he devised a mechanical procedure based on scientific principles named as chain procedure. Chain indexing means use of chain procedure. With the help of chain indexing, Ranganathan for the first time revealed that indexing could take much help from clas-

sification as the classifier and indexer have to analyse the subject content of a document and then formulate the name of subject in the form of class number and subject or index heading respectively.⁵ Ranganathan's idea of chain procedure started getting importance not only because his terms were considered as the only answer to cataloguing symbiosis but also because this would eliminate the time consuming efforts of analysis and synthesis leading to subject formulation on the part of an indexer. This facilitates the giving of many access points and perhaps was the main consideration behind the concept of chain indexing.

51 Application to other Indexing Systems

511 BNB

When BNB was being discussed and organised in Great Britain a proposal from Australia was made privately to the organisers and publically in an article on Library co-operation in the British Commonwealth in the *Librarian*, May 1948, that as the dictionary catalogue was commonly used in the Commonwealth outside Great Britain there might be discussions with the other British Library Associations on the possibilities of something like the dual purpose entry—the classified and the dictionary.

From the very beginning the British National Bibliography was following chain procedure based on class numbers constructed according to the Decimal classification.

Wells explained that "In adopting chain procedure we run into some difficulties in relation to the structure of the DC numbers, the missing links, the obscure links and the unsought links in the Chain."⁶ Since the structure of DC numbers frequently omitted the steps in the hierarchy of terms he further suggested some modifications which were adopted for BNB with success.

5111 Modification as made by BNB. Since its foundation in 1950 BNB had been adopting the chain procedure. It represented the first large scale, systematic and continued general application of chain procedure. It was observed that the need for deriving the subject headings mechanically and consistently from the class numbers was felt. Hence, modifications were made in rendering the subject or class headings having common isolates to a Classified Index/Catalogue.

The BNB preferred to have the benefit of deriving the subject headings mechanically and consistently and would like to retain some kind of entries they were accustomed to when they depended on dictionaries of subject headings.

For this purpose, certain modifications were suggested by E.J. Coates and others.

5112 Modifications in the sequence of components in subject headings. An entry is occasionally derived using a chain. This procedure will be unsuitable for use in a dictionary catalogue. The terms with widest conotation should come first in the sequence.

52 Modification : For Chain Procedure

Coates suggested modifications in reference structure.⁷ He suggested that instead of linking all subject reference headings to the specific subject headings it may be done simply by referring to the next more specific heading.

Ranganathan suggested modifications in both aspects, viz., sequence of components and reference structure.⁸ In the case of class number of document that has got the digit(s) denoting common isolate(s) such as space, form, phase relation, etc., the class number is to be divided into two parts (i) the first part is the chain with digits, preceding the digit denoting common isolates; (ii) and remaining digits forms the second part.

For modification in subject reference structure, reference headings are constructed with necessary and sufficient upper link term to make it meaningful and individualised.

E.J. Coates is of the opinion that a close watch on the classification schedule of terms must be maintained which he recorded on the basis of his experience for adopting chain procedure for BNB and British Catalogue.⁹

6 PPOSI AND PRECIS

POPSI and PRECIS are indexing procedures helpful in deriving the subject heading and subject index entries in a consistent way. Both the indexing systems developed almost at the same time around the later part of the sixties. POPSI being developed by Neelameghan and his group at DRTC, whereas PRECIS was developed by Derek Austin and his group at BNB. POPSI stands for "postulate based permuted subject indexing." The

work at DRTC leading to the development of POPSI may have said to begin as a result of the need for overcoming the limitations of Chain Indexing. Thinking in this direction began firstly in 1964. In 1966 an experiment was conducted for teaching purposes in DRTC. The result of this experiment being satisfactory, a research project was taken up at DRTC in 1967 and it was completed in 1968. The result of this research was, however, published in 1969.¹⁰ Since then continuous research in this new line of thinking is going on. PRECIS manual came out in 1971.

In these indexing systems the format and structure of index entries and the grammar based on postulates and principles in POPSI and the role operators in PRECIS regulate the writing of input strings.

The arrangement of specific subject heading according to the context of situation is the main concept emphasised both in PRECIS and POPSI. Yet, while working out the detail of their systems they differ. Thus while POPSI employs cyclic permutation of terms and some eight different steps, an extension of chain procedure, PRECIS has codes denoting role operators, differencing operators and context dependency.

The format of component terms in PRECIS consists somewhat of a one-to-one, i.e. a hierarchical relationship, while in POPSI the relationship (which may or may not be hierarchical) is based on certain postulates and principles, e.g. when the component terms are A.B.C.D. the format of the entry would be like ;

A-B-C-D in PRECIS and A>B>C>D in POPSI (the symbol > denotes the hierarchical or inclusive relation).

61 POPSI

POPSI as its name indicates is based on postulates considered to be part of a general theory of subject indexing language and uses the postulates of general theory of library classification formulated by Ranganathan.

As a process for preparing subject propositions, it consists primarily of analysis synthesis and permutation.

In POPSI there is a postulated basic structure of subject proposition. When this structure forms the foundation for preparing subject proposition, it is called as "POPSI BASIC", which can be systematically manipulated to generate its

specific version called "POPSI—Specific" requirements.

POPSI was developed to incorporate into the alphabetical catalogue of all the good features of the classified catalogue for deriving the chain of structured subject formulation. It is not necessary to depend on class number but a classificatory base is necessary. POPSI has further been defined as a "procedure for implementing the policy which is known as juxtaposition by keeping each specific subject heading parallel to the horizontally presented chain serving as the basis.

62 POPSI—Improved Version of Chain Indexing

POPSI has got over the difficulty of disappearing chain.

POPSI is not based upon any scheme of classification but uses the ideas and theory of classification both in the analysis of subjects and also in the structuring of the names of subjects.

It has increased the possibilities of deeper analysis and also analysis for different purposes. In fact, POPSI has introduced the use of indicatros digits, in the full representation of subjects, as an additional syntactical device.

It has also introduced better format and method of display of entries than chain indexing.

To derive chain of structured subject formulation POPSI is not dependent on class number.

63 Experiments with POPSI

POPSI has been used in practice in the following publication.

- 1 MACHINE TOOL Abstracts (Central Machine Tool Institute) V 1; 1972.
- 2 SOCIAL SCIENCE RESEARCH (Indian Council of—) Mohandas Karamchand Gandhi: A Bibliography. 1974.
- 3 SANGAMESWARAN (SV) and others. Fish Technology : A Bibliography 1969-74, 1975.

An experiment conducted in JNU Library in December 1979 in order to test its validity, very good results establishing its significance in the field of social science were obtained

Thus the system has immense possibilities. If it is applied in preparation of bibliographies and indexing lists, the finer details can be worked out.

64 PRECIS

In PRECIS input string terms are organised into a sequence according to what is called the principle of Context Dependency. This means that terms are arranged so that each term sets the next into its proper context, in much the same way as the words in sentences are frequently context dependent and the meaning of the sentence is often not clear until the final word has been added. There are many role operators which embody the "syntax of PRECIS."¹²

The flair or knowhow of the indexer plays an important role in determining the subject headings in almost every indexing system. The use of operators in PRECIS and the connecting symbols in POPSI begins only after the indexer has mentally established some kind of statement which summarises the subject. In PRECIS the standard format procedure was originally devised for shunting separate parts of a compound subject.

An entry can be produced under any part of a compound term. The term is written as part of the input string, its part being set down in the reverse of the natural language order. This shows some similarity with the chain procedure when the subject headings are displayed.

In PRECIS each part is prefixed by a code which indicates whether or not the part is needed in the lead term or whether it functions as the focus. Ranganathan's idea of missing links (*viz.*, fused link, unsought link, false links, etc.) can clearly be discerned behind Derek Austin's concept of prefixing a case for lead terms or focus in PRECIS.

7 CONCLUSION

Thus, we can say that the accepted method of compiling a subject index is by a process known as chain procedure introduced by Ranganathan and popularised in Britain by Palmer and Wells, Coates, Mills and the BNB. The system shows the index in its true light as an "integral part of classification system" (Mills) and ensures, "the symbiosis of classification and cataloguing" (Ranganathan). Rules for Dictionary Catalogue by Cutter was the earliest code to give specific rules with regard to the contribution of subject entries which give rise to many inconsistencies. These inconsistencies were due

to language synonyms and homonyms. Chain procedure was devised by Ranganathan as a solution to the inconsistencies.

It is a classic contribution of Ranganathan. Its importance lies in the fact that it is the systematic procedure laid down for subject indexing.

E.J. Coates says that chain indexing, reflecting the modulated structure of the classification scheme, tends to represent complex ideas by means of a elementary combined terms rather than by single complex terms. Because of this, the coverage of subject relationship signalled by a classified catalogue supported by collocation of terms in chain index is probably greater than that produced by any alternative method of indexing. Growth of knowledge is complex. Chain procedure was found inadequate, so the need for some other mechanical system was felt. The result was the development of POPSI and PRECIS. The basic principles behind both the systems, of course, was chain procedure.

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SECTION 4

DOCUMENT DESCRIPTION

4.1 Ranganathan's Normative Principles and AACR-II

B. GUHA and H. N. PRASAD

Discusses Ranganathan's normative principles in the field of cataloguing. Examines the feature of AACR. Highlights the Paris principles and their limitations. Critically examines the influence of the different canons in AACR-II. Also examines certain rules. Highlights the potentiality of the canon of recall value whose application is sure to bring out a change in the cataloguing rules. Remarks on the future of AACR-II, in the light of canons if implemented.

1 INTRODUCTION

S. R. Ranganathan's contributions in the field of cataloguing have been recognized all over the world. He was the first person to distill out certain principles on which the rules of the code could be based. In 1938 he published his book "*Theory of Library Catalogue*" in which he explained and discussed the different normative principles usually known as canons. These canons were further explained in his *Heading and Canons* (1955): These canons have certainly influenced the cataloguing practice at large. The influence of Ranganathan's contribution in the study of cataloguing has been expressed by J. Mills in the following words: "The influence of Dr Ranganathan on the study of classification and cataloguing is more than the result of tireless investigation of, and prolific invention of solution to,

the complex problems associated with the subject, it springs also from his clear cut awareness of its proper relations to the rest of the librarians studies and to the bold and graphic language which reflects so happily his infectious enthusiasm."

2 NORMATIVE PRINCIPLES

The normative principles can be categorised as under :

- 1 General Laws
- 2 Laws of Library Science
- 3 Canons of Cataloguing

These set of normative principles are said to guide the entire work of cataloguing in general and to the following in particular:

- 1 Drafting of a catalogue code and the formulation of rules;
- 2 Interpretation of rules to meet new problems brought up by certain documents or by change in the practice of book production; and
- 3 Provision of suitable guidance for cataloguing work.

The general laws as enunciated by Ranganathan are mainly five. These are Law of Interpretation; Law of Impartiality; Law of Symmetry; Law of Parsimony; and Law of Local Variation. The Law of Interpretation states that a catalogue code is like a legal document. Any rule in it should be interpreted like a legal text. In practice there may be conflicts between one rule with another. In actual application such conflicts should be resolved with the aid of Law of Interpretation.

The Law of Impartiality states that—between two or more claimants, say for use as heading, the preference of any one should be made only on sufficient ground and not arbitrarily. The Law of symmetry—the principle that of two entities or situation which admit of being regarded as symmetrical counterpart of each other, if one of the situation or the entity is given weight in one particular context, the other entity or situation should also be given a corresponding weight.

The Law of Parsimony reads as—between two or more possible alternative rules bearing on a particular phenomenon

the one leading to over all economy manpower, material, money and time considered together with proper weightage is to be preferred.

The Law of Local Variation states that the international catalogue codes should mark out the factor to be left to the care of each national catalogue code', a national catalogue code should mark out the factors to be left to the care of each linguistic catalogue code in a multilingual country such as India. The catalogue code in each hierarchical line should be consistent with one another without any mutual contradiction.

The Canons of Cataloguing are the implications of the five laws of library science. The different canons of cataloguing are :

- 1 Canon of Ascertainability;
- 2 Canon of Prepotence;
- 3 Canon of Individualization,
- 4 Canon of Sought Heading;
- 5 Canon of Context;
- 6 Canon of Permanence;
- 7 Canon of Currency;
- 8 Canon of Consistence; and
- 9 Canon of Recall Value.

3 TOWARDS AN INTERNATIONAL CODE

A catalogue code comprises certain set rules governing the choice, rendering and form of entries in catalogues of libraries. The catalogue once upon a time regarded as the individual library's concern is no more so, now. It has become an international concern. The recent developments like shared cataloguing programme, centralized cataloguing programmes and the ultimate concept of Universal Bibliographic control have motivated us to think of having a true international code of cataloguing transcending all barrier of space, language and form.

It has been claimed that the AACR has been the culmination of decades of research work in the field of author and title cataloguing. Whill examining the development of catalogue code to the present AACR-II, one very important trend can be discerned. The trend is that the concept of catalogue as the

inventory of the holdings of the library has changed to that of a retrieval tool. Accordingly with the change in the context, the scope and nature of the rules have also changed. We find a definite change in the rules. Earlier, Panizzi's 91 rules were mainly concerned with the author only. All the codes earlier to Ranganathan were codes for author and title cataloguing. Ranganathan was a staunch supporter of classified catalogue and hence from his time the importance of author and title catalogue diminished.

4 PARIS PRINCIPLES AND RANGANATHAN

The first deliberate attempt to formulate principles for the construction of an international code is that of Ranganathan. To quote Bakewell, "Ranganathan has always been a keen advocate of an international code with supplementary national codes to cover local terminology and peculiarities." In 1954 IFLA decided to set a working group on the international coordination of cataloguing principles. The result was the International Conference on Cataloguing Principles held in 1961. The conference agreed upon certain principles. These statement of principles throw light on the structure of the catalogue, kinds of entries and, use of multiple entries. The conference was criticised, for, it paid little attention to the books of the future, did not pay attention to the need of general readers, librarians from big libraries had dominating roles, public libraries were not heard properly, principles at deeper level were not taken up, and normative principles of Ranganathan were not adequately considered. Ranganathan became the severest critic of the *ICCP* findings.

5 BASIC PRINCIPLES OF AACR-I

AACR-I is based on Paris Principles. The rules have been designed to meet the requirements of multiple entry catalogue. The four general principles behind AACR-I are:

(i) Entry should be under author or principal author when one can be determined.

(ii) Entry should be under editor when there is no author or principal author and when editor is primarily responsible for the existence of the work.

(iii) Entry should be under compiler named on the title page in the case of collection of works.

(iv) Entry should be under title in case of the other works whose authorship is diffuse or indeterminate.

51 *Limitations of AACR-I*

Thus we see that in this code, rules are not found to deal with every specific problem, instead the emphasis is more on types of authorship and classes of names. This is the major difference from the earlier code. AACR is a complete code in the sense that it includes rules for manuscript, maps, film, print, records, etc. Authorship is based on the intellectual responsibility concept. This was the first modern code, requiring a new analytical way of thinking on the part of the cataloguer. Nevertheless, a new edition was needed partly because of residual faults in AACR-I and partly due to world wide developments in cataloguing which rendered much of it out of date. Looking at AACR-I in retrospective one can see that:

a despite a very large measure of agreements there were still two texts, British and North American,

b there were several amendments, some tending to bring the two texts closer and some working the other way;

c the code was still considered as an author and title code for cataloguing;

d there were still areas of traditional author and title cataloguing which were unsatisfactory, notably the treatment of corporate authorship.

6 GENESIS OF AACR-II

AACR-II published in 1978 is said to be a culmination of three decades of research work in author, title and descriptive cataloguing. An attempt has been made to develop a true international code. There has been a definite impact of Ranganathan's theories for we find that the rules of choice and the rules for rendering and description have now been separated. There is considerable emphasis on descriptive cataloguing. The *ISBD* format has been included in AACR-II. The recent developments like MARC project, shared cataloguing programme, CIP and other mechanised cataloguing programmes have rendered it essential to bring out a code of cataloguing

having such areas in catalogue entries with distinct punctuation marks acceptable to machines. The AACR-II can therefore be deemed as a code having standardization in not only author and title cataloguing but descriptive cataloguing also.

In spite of its claim for an international code the rules of the *AACR-II* are pedantic to the extreme. The rules are framed having in view large libraries, research and specialized libraries. The small and medium sized libraries have to resort to considerable amount of local variation to work with the code. Ranganathan's principle of *local variation* should have been considered and the rules framed accordingly.

The rules of *AACR* are basically the outcome of Paris Conference (1961). The opinion of Ranganathan on the finding of ICCP is worth recording. For example the prescription with regard to change of name of personal author involved the violation of the *canon of permanence* in the case of living author. He also suggested that the *canon of ascertainability* which was accepted in the case of corporate author should be used in the case of personal author, also. He was of the view that finding a compromise among the differing tradition and practices was not sufficient. As a corrective he had suggested that author session of the conference should be held to formulate agreed normative principles for cataloguing. The *ICCP* was more biased towards the past and paid little attention to look into the future. The final statement of principles also illustrate in many instances a desire to achieve agreement rather than enunciate clear and precise rules or principles. The normative principles ought to have been discussed there than the specific rules. We should have one opinion on certain set of principles, designating them as normative principles.

7 CANON OF ASCERTAINABILITY AND AACR-II

Ranganathan in the early 1950's had examined the different codes with regard to the choice of personal author headings and pseudonymous headings. Realising the difficulties caused by translation and transliteration he had advocated for the canon of ascertainability. The importance of this canon was not realised by the early framers of the *AACR-I*. But the same began to be realised later on and a definite care has been taken in *AACR-II* although under a different terminology, i.e., chief

sources of information. Rule 2.0B1 of AACR-II states "The chief source of information for printed monograph is the title page or if there is no title page, the source from within the publication that is used as a substitute for it." The prescribed sources of information for each area of the description of publication has been indicated. The same has been spelled out for other forms of publication also. Thus, we find that Ranganathan's canon of ascertainability has been duly considered by AACR-II.

In this context it would be relevant to cite two specific instances where the application of canon of ascertainability can be clearly seen. In the two sets of rules under 21.6 (works of shared responsibility) and 21.12 (revision of texts) the choice of heading is determined now 'by the wording or layout of the chief source of information.' In the case of revision, the cataloguer is no longer asked to assess the extent of revision and then sit in judgement as to whether the original author or the revisor should be chosen for the heading, as was the prescription earlier.

Ranganathan always advocated for the principle of least range of search to solve problems. In order to enable the cataloguer to depend on title page he advocated for the standardization of title page in collaboration with the publishing and printing trades. It would have been ideal if ICCP would have first agreed on normative principles such as canon of ascertainability, canon of prepotence, canon of permanence, canon of sought headings and other important principles propounded by Ranganathan.

Violation of the Canon

The canon of ascertainability advocating for title-page-tag cataloguing has a definite implication in AACR-II. The rules more or less adhere to the canon of ascertainability. If we examine the rules minutely we find instances where violation of this canon is also there. The following example from AACR-II will clear the point.

The choice of person as author is governed by general rule 21.1A 2 which reads "Enter a work by one or more persons under the heading for the personal author. But the provision given in the last part of the rule 21.4A which reads as "Enter a work, a collection of works or selections from a work or works by one personal author under the heading for that

person *whether named in the work or not*". Under this provision the practising cataloguer has been asked to consult extra-bibliographical sources to ascertain the author if not given in the document itself. This clearly violates the canon of ascertainability.

The second example to record is regarding corporate authorship. The Rule 24.1 reads "Enter a corporate body under the name by which it is predominantly identified, except when the rules that follow provide for entering it under the name of a higher or related body or under the name of a government."

In the above rule use of the word "predominantly identified" will definitely create confusion in the mind of the cataloguer. The next para of the rule appears to provide some clue for determining the predominantly identified names, i.e., from items issued by that body or even from reference sources. The chief source of information as authority provided for the purpose has been flouted to some extent and the cataloguer is asked to go through a number of sources issued by that body or even he has to go to reference sources. The rate at which there is mushroom growth in the number and variety of corporate bodies, the quantum of time and effort on the part of individual would be considerable.

8 CANON OF CONTEXT AND AACR-II

The canon of context is bound to have effect on AACR-II for obvious reasons like the change in the book production and the form of documents. In this electronic age we are making more use of non-conventional types of documents. The documents in electronic forms are available. If this trend continues, the rules of AACR-II have to be modified as per the demand of the canon of context, with the printing of bibliographies and bibliographical data available on-line, the AACR-II rules will need re-examining. Already in view of mechanized cataloguing AACR-II has incorporated ISBD rules. Ranganathan's normative principles to have the potentiality to act as yardstick and guide in the framing of rules in the future. The AACR-II has to be alert in visualising the change in context. AACR-II claimed to be truly international code should mark out the areas to be left to the care of the national catalogue codes. This is needed as per the principle of local variation.

9 CANON OF RECALL VALUE: ITS IMPORTANCE

It has been now felt that in displaying the catalogue and formulating codes of it, the readers approach is of primary importance. Therefore, the headings of the catalogue entry should be such which most of the users may consult or which they are supposed to retain in the memory or may voluntarily be recalled back to their memory. The Canon of Recall Value has been evolved to serve as a guideline to assign such names to headings which users are likely to look for on the basis of their recall value. This canon helps the cataloguer in rendering of the multi-worded name of a person, of an organ of Government, of an institution, and of a conference and the title of a document in the heading of a catalogue entry.

There are five main factors that are responsible for affecting the usual recall by the users of the catalogue. The factors are— increase in the number of corporate bodies, increase in the variety of corporate bodies, near homonymous names, growing tendency of multi-wordedness of names of corporate bodies. The psychological factor is also there which govern the recall. Ranganathan's canon of recall value considered to be master canon recognises the need to choose the term which has the highest recall value in the corporate body's name as the entry element. This canon will certainly bring revolution in the cataloguing world. This canon has high prospect for exploration. The validity of the canon should be confirmed by world wide survey. This is certainly going to influence the future of AACR-II. The canon of recall value being considered as the master canon has a direct conflict with the canon of ascertainability and canon of prepon. With the catalogue going on line and other mechanised cataloguing projects the canon of recall value if considered objectively will bring forth a drastic change in AACR-II. It will bring about a revolution in the cataloguing practice.

10 FUTURE OF AACR-II AND ROLE OF NORMATIVE PRINCIPLES

Any consideration of the future of AACR-II must begin with a description of the present status of files of bibliographic records in libraries. Looking into the developments of the last several years, it is expected, that cataloguing would be very

interesting and enthusiastic discipline in the next few decades. It is difficult to predict the extent to which AACR-II, without a general theory of authorship, will affect cataloguing practice and implementation of the code. Less emphasis now being given to the concept of corporate authorship, the cataloguer can now use authorship only to refer to works for main entry under the name of a person. The rule prescribing the conditions under which the main entry is to be made under the name of the corporate body now consists of specifically certain kinds of works as the basis of decision rather than the conditions of the creation of the document.

However AACR-II does present many options and already it is necessary to consult a number of supplementary sources to determine the application of rules. The major strength of AACR-II lies in its treatment of descriptive cataloguing. The code provides directive for description of documents for all types of media or documents in an internationally accepted format and promises accomodation of future media also in a far better manner than the AACR-I. Unfortunately cataloguers and others will not find a general statement of principles of authorships and entry, they must adjust to a fundamental change in the theory of corporate authorship and to an increased emphasis on sought heading in the light of the canon of sought heading.

11 CONCLUSION

A set of normative principles is one of the outstanding contribution of Ranganathan in the field of cataloguing. The potentiality and versatility of these principles have not been fully realised by the library profession at large. Although Ranganathan's views as given in his *Heading and Canons* have influenced the formulation of some rules to certain extent. Ranganathan's canon of recall value needs to be further explored although being everlooked by different codes. The new developments in ISBD's and MARC projects have greatly necessitated for a truly international code of cataloguing. In order to make *AACR-II* a true international code the designers should objectively re-analyse the rules from the angle of some normative principles such as Ranganathan's. This will greatly improve the cataloguing practice of the future.

Ranganathan's eminence as a classificationist has, perhaps, obscured his contributions in other areas to some extent. May be in these days of intense specialization versatility in many areas is becoming a rare thing. However, in his writings there are such penetrating discussions of cataloguing problems and new ideas for their solution that they, if accepted, can make his contribution to cataloguing as profound and far-reaching as his formulation of the general theory of classification has done in the area of classification.

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4.2 Application of Ranganathan's Canons of Cataloguing to Indian Muslim Names

KAMLESHWAR NATH GUPTA and MOHAMMED HAROON

States the nature of Indian Muslim names, their problems in cataloguing and discusses various available solutions with particular reference to Ranganathan's treatment of Muslim names. Examines Ranganathan's Canons of Cataloguing and discusses them as the guiding tools for cataloguing Muslim names.

To find out usefulness and helpfulness of Ranganathan's Canons particularly the Canon of Recall value a survey has been undertaken where the users have identified the readable words from a sample of 192 names of living Muslim authors writing in 22 Indian languages. The results of the survey have been discussed. Conclusions and suggestions based on the literature and the survey have also been given.

1 MUSLIM NAMES

The Muslims from all over the world because of one Faith, One Book and the same ancestors have the common roots for their personal names. The main source of giving personal names to Muslim is the ninety-nine names of God; ninety-nine names of Prophet Mohammed and the names of other Prophets as mentioned in the Holy Quran. With the rise of Islam the Muslim names also changed and the names of old pattern were dropped and new ones adopted. Words as Mohammed, Ali and Abdullah, etc., were used as personal names so intensively that they ceased to have distinctive value, unless compounded with some other name. When Islam spread to other areas beyond Arab world, new personal names as Persian and Turkish names also came in use. The Arabic names have influenced the Muslim personal names of every region and hence India is no exception.

11 *Indian Muslim Names*

Having originated in Arab world and travelled across Persia, Central Asia and the Middle East, the tradition of Muslim names reached the Indian sub-continent about a thousands years ago. In the process of acclimatization with an entirely alien social, cultural and religious milieu, this tradition ceded from its ancestral kinship. It broke off from the Arabian tradition of names being honorific-studded, over prefixed and suffixed, complicated and long-winding names. The pattern of Muslim names gradually acquired the typically Indian elements of simplicity and conciseness. This slow and gradual process of Indianization of Arabic names may be seen with the study of authors's and poets' names in Indo-Persian and Urdu literature.

12 *Problems in Cataloguing of Indian Muslim Names*

The Muslim names from the Arab world have always been a nightmare for the cataloguers, bibliographers and the librarians. The Indian Muslim names have radiated typical problems in variegated operations of bibliographic control in an equal measure. Well known cataloguing codes like AACR and CCC have touched the subject of rendering of Muslim names only tangentially and have left desirability of serious and more systematic study of their structure and treatment from the angle of their use in library and documentation work. In this context bibliographical practices are as varied as the bibliographical sources themselves.

The Indian Muslim names pose a number of problems to the cataloguers. These may be summarised as under:

- 1 Muslim names are comparatively lengthy having multiple constituent elements, viz. Khitab, Laqab, Ism, Takhallus, Nisbat, and in some cases Kunyat too.

- 2 There are no set rules or religious and social customs for their designing and structure.

- 3 The function of the some constituent word changes with place, e.g., as the word Hakeem may be a Laqab, Ism or Takhallus.

The above are some of the problems and these make the choice of entry element difficult. Rules provided in the cataloguing codes are not sufficient and clear for deciding the entry element(s) for Muslim name.

13 Solutions Offered

Muslim personal names from India present a variety of cataloguing problems. Experts from the East as well as from the West have offered solutions. Most of the cataloguing codes have treated the Muslim personal names alike irrespective of diversity of the nationalities and cultural traditions among the Muslims living over the vast expanse of Asia, Africa and Europe. AIA Cataloguing Rules (1949) favour given name for the authors prior to 1900 A.D. and for later authors shortend forms of names and surname. International Conference on Cataloguing Principles (1961) also decided that a Muslim author be catalogued under well known name, surname or surname like word. In case there is no surname in a name, then Rule 54 of AACR I (1967) directs to enter by best known name or the last elements. AACR II (1978) prefers the entry of Muslim names in surname or a word performing the function of surname. In other cases entry is to be by first element.

14 Solution Offered by Ranganathan

Right from the very begining, Ranganathan has been very clear about the complexity of Muslim names. He has observed that "It is no easy matter for cataloguers without special knowledge of Arabic culture to deal with names of such complexity.¹ He did not have enough experience with Muslim name so as to enunciate definite rules for their choice and rendering. He therefore states that "It may be stated that there is still room for systematization. There is scope for research in Arabic names.²

In his Classified Catalogue Code (1934), Ranganathan has given nine tentative rules for cataloguing of Muslim personal names. The same rules are found in Dictionary Catalogue Code (1945) and three subsequent editions of Classified Catalogue Code. In the 5th edition of Classified Catalogue Code Ranganathan has given the structure of Arabic names that resemble to Shrif's Persian names of the period 652-1926. Almost all the Indian authors writing on Muslim names have followed Ranganathan.

2 NORMATIVE PRINCIPLES OF CATALOGUING

In addition to the rules, Ranganathan had also given normative

principles of cataloguing that fall in four categories.

- 1 General Laws
- 2 Laws of Library Science
- 3 Canons of Cataloguing and
- 4 Laws of Local Variation.

We are concerned with canons of cataloguing in this paper.

21 *Canons of Cataloguing*

The Canons of Cataloguing were formulated for the first time in India by Ranganathan in his *Theory of Library Catalogue* (1938). The number being 6. In 1955, in his *Heading and Canons*, he added two more canons. In *Classified Catalogue Code*, ed 5 (1965) Ranganathan omitted one and added another canon. These canons of cataloguing are probably ahead of time.³ They are applicable to cataloguing that is to.

1 Drafting of a Catalogue code, including the formulation of each rule;

2 Interpretation of the rules to meet new situations brought up by a particular document; and

3 Provision of suitable guidance for Cataloguing work.*

There are eight Canons of Cataloguing in the *Classified Catalogue Code* and in 1969 Canon of Recall Value has been added. Now these canons are as follow:

- 1 Canon of Ascertainability
- 2 Canon of Prepotence
- 3 Canon of Individualizing
- 4 Canon of Sought Heading
- 5 Canon of Context
- 6 Canon of Permanence
- 7 Canon of Currency
- 8 Canon of Consistence
- 9 Canon of Recall Value

Ranganathan's Canons of Cataloguing are helpful for cataloguing Muslim personal names too. With the help of these, the librarians may interpret the rules in various codes. They may add supplementary rules too. If a new set of cataloguing rules for Muslim personal names is to be drafted, these canons are

useful too.

221 *Canon of Ascertainability*

The Canon of Ascertainability prescribes 'that the information found in the title page of the document catalogued and its over flow pages should determine the choice and rendering of various sections.'⁵

The Muslim personal names are comparatively lengthier and have various elements as pen-names, Takhallus, Nisbat, Laqab and Khitab. Description of names changes from book to book. Since the same author appears differently in different publications, the cataloguer has no choice except to follow the canon and render the names accordingly. For example Dr. Iqbal's names has been given in various books as follow:

Mohammad Iqbal
Allama Iqbal
Sheikh Mohammad Iqbal
Dr. Mohammad Iqbal
Sir Mohammad Iqbal
Allama Mohammd Iqbal

By following this canon, there will be more cross-references in the catalogue.

Another problem is with regard to ascertaining the date of birth and in majority of Muslim writers, it cannot be ascertained from the document and cataloguers are bound to search other reference tools. In the Urdu books catalogue of the Delhi University Library System, the cataloguers have failed to ascertain the date of birth even for well known and widely read Urdu authors such as Adil Rasheed, A.R. Khatoon, Mazhar-ul-Haq, Alavi and Razia Butt.

212 *Canon of Prepotence*

It states that the potency to decide the position of an entry among the various entities in a catalogue should if possible, be concentrated totally in the leading section and even there it should be concentrated as much as possible in the entry element.⁶ Ranganathan further says that the probability for the same word to be used as entry element in several headings is inversely proportional to the numerousness of the groups

from which the word is chosen; and the smaller this probability the greater will be concentration of potency in the entry element

Among the Muslim authors names, Takhallus is a word that is normally not used by other contemporary writers. In this sense it is most potent word for entry element. Now among Indian Muslims there is growing tendency to use family names and or surnames and the words performing the function of surnames. But in chapter HF of Ranganathan's Code Isms get preference over Takhallus and Nisbat names. So there is conflict between Rules and Canon.

213 Canon of Individualising

According to this canon, the name of an entity used as the heading of a catalogue entry, should be made to denote one and only one entity, by adding to it necessary and sufficient number of individualizing elements. By adding date of birth an author is fully individualized. But in case of Indian authors generally and Muslim authors particularly the date of birth is not available. So in Muslim authors Laqab Khitab and place names may be used as individualising elements as

Asar, Mohammad Ali
 Asar, Khwaja Mohammad Mir
 Asar, Ansari
 Asar, Fakhruddin Siddiqi.

214 Canon of Sought Heading

According to this canon, the decision regarding choice of entry words and rendering of names and added entries should be based on the question whether a reader will search an author under that name or not. This canon empowers cataloguers to take into consideration the reader's approach. As the cataloguers and users are not much familiar with Muslim personal names there are more chances of mistakes. In most cases the Urdu knowing readers will search a poet by Takhallus. The non-Muslim readers are habitual of surname and the survey undertaken by the authors has revealed that non-Muslim readers generally take the last word as surname and may approach the catalogue by that word or words. For examples Azad will be the sought word in the following Urdu

authors names:

Nawab Sayyid Mohammad Azad
Abdul Ahad Azad
Sayyid Mohammad Azad
Maulana Abul Kalam Azad
Ahmed Hussain Azad
Asrar Ahmed Azad
Agba Mohammad Tahir Azad
M. Mohammad Taqi Azad.

215 *Other Canons*

The rest of the canons, namely Canon of Context, Canon of Permanence, Canon of Currency and Canon of Consistence have little to do with Muslim personal names.

216 *Canon of Recall Value*

Canon of Recall Value is the last canon enunciated by Ranganatha. It has come to be a master canon, of which many of the other canons of cataloguing have become corollaries.⁷ This canon has been defined as follows.

The principle is that:

In the multi worded name of Person, Government, Near Sovereign Body, Quasi-Government, an Institution, a Conference, an Organ of a Government, or an Institution or of a Conference and in the multi-worded title of a document, the entry element is to consist of the word or the word-group with the highest recall value.⁸

2161 Two approaches to Canon of Recall Value. The Canon of Recall Value is basically concerned with readers approach to the catalogue. One approach is reader as an individual and the other takes him as the member of the society where he moves.

2162 Reader as individual. A reader while consulting the catalogue may not remember all the words and their sequence. There are words that are easy to 'memorise and so having higher recall value. Therefore 'the efficiency of the cataloguers response to the readers approach is to be considered in of the psychology of a normal relation to certain attributes reader particularly the capacity of memory.⁹

2163 Reader as member of society. In each society the

persons are not addressed by full names but by a part of it. This fashion of addressing the persons provides a sound principle for finding out the entry words in personal names. Cataloguing rules when framed on this consideration will provide balanced and sound rules to which readers too will agree.

2164 Recall value in Indian Muslim names. In Indian Muslim personal names, the recall value differs from word to word. For this purpose these names may be divided into three groups.

1 This group consists of names having one such word by which they are generally addressed and remembered in their society. In library catalogues too the readers may approach these names by those addressed names. These elements are Takhallus as Ghalib, Iqbal and Faiz and Nisbat names as Qureshi, Abbasi and Chishti.

2 The second group consists of those names which do not have any element like Takhallus and Nisbats but in society there exists a tradition that decides the fashion or the way by which these names shall be addressed. For example compound names as Abdul Rehman will be addressed in full. In case there is one Ism with compound names, that Ism shall be the addressed word as in Abdul Qadir Kamal. The word Kamal has the highest recall value

3 In this group, there are the names of eminent personalities. In society there is no permanent tradition for addressing them. These personalities are known and remembered by any word or words and that part of name becomes the best known name. As Sir Sayyed Ahmed Khan, Dr. Sheikh Mohammad Iqbal, Moulvi Abdul Haq and Deputy Nazir Ahmed.

2165 Indian context. It seems plausible that in library cataloguing the readers' normal capacity of recall and society's fashion of addressing persons may be considered. Any rule based on these two principles will be sound and acceptable to the users of library catalogue.

But India is a vast country, with differing cultures. There are 15 national languages recognized by the Constitution of India. The recall capacities differ from region to region. Moreover Indian Muslim personal names have no fixed structure. The elements in these names may differ. The function

of the word drastically changes as soon as its place is shifted.

3 SURVEY

With a view to know the recall among library users one hundred persons were given a sample of 190 living Muslim authors names who are writing in 22 Indian languages. In all 36 of responses were found complete and were analysed.

31 Analysis of Responses

After eliminating single worded and identical names the results were compiled. A summary of the readers 'recall' is given below.

311 Two Worded Ism Names

S. No.	Authors' Names	Author's Choice	Readers Choice	
			First Part	Second Part
1	Abid Adeeb	Abid Adeeb	19	17
2	Ahmed Basheer	Ahmed Basheer	23	13
3	Ahmed Salim	Ahmed Salim	24	13
4	Anwar Azeem	Azeem, Anwar	22	14
5	Asghar Wajahat	Wajahat, Asghar	15	21
6	Hymayun Kabir	Kabir, Humayun	22	14
7	Jeelani Bano (W)	Jeelani Bano	20	16
8	Karamat Ali	Karamat Ali	18	18
9	Masud Hasan	Masud Hasan	17	19
10	Mazhar Imam	Mazhar Imam	17	19
11	Manzoora Akhtar (W)	Manzoora Akhtar	16	20
12	Mahboob Badai (W)	Badai, Mahboob	15	21
13	Mohammad Hasan	Mohammad Hasan	20	16
14	Mohammad Yasin	Yasin, Mohammad	15	21
15	Mohammad Shan	Mohammad Shan	18	18
16	Mohammad Zakir	Zakir, Mohammad	17	19
17	Mohammad Mujeeb	Mujeeb, Mohammad	14	22
18	Mohammad Naji	Mohammad Naji	16	20
19	Muzaffar Aasim	Muzaffar Asim	15	21

20	Noorand Haneef	Haneef, Noorand	13	23
21	Noor Shah	Noor Shah	18	18
22	Qamar Rais	Qamar Rais	18	18
23	Raza Ahmed	Raza Ahmed	20	16
24	Sardar Ahmad	Sardar Ahmed	19	17
25	Safi Shauq	Shafi Shauq	13	23
26	Shamim Anwar	Shamim Anwar	19	17
27	Shabbir Hakeem	Shabbir Hakeem	17	19

312 *Two Worded Names with Nisbat or Takhallus*

1	Akbar Hyderi	Akbar Hyderi	16	20
2	Aslam Allahabadi	Allahabadi, Aslam	19	17
3	Ayyub Premi	Ayyub Premi	18	18
4	Baqar Mehdi	Mehdi, Baqar	17	19
5	Ismat Chugtai	Chugtai, Ismat	13	23
6	Manzoora Akhtar	Manzoora Akhtar	16	20
7	Mahboob Badai	Badai, Mahboob	15	21
8	Munawar Naji	Munawar Naji	16	20
9	Mushtaq Kazi	Mushtaq Kazi	11	25
10	Nafis Afridi	Afridi, Nafis	7	29
11	Sajida Zaidi	Zaidi, Sajida	10	26
12	Zarina Sani	Sani, Zarina	13	23

313 *Compound Names*

1	Abdul Hamid	Abdul Hamid	26	10
2	Abdus Samad	Abdus Samad	24	12
3	Abdus Sattar	Sattar, Abdus	24	12
4	Badiuzzama Khawar	Khawar, Badiuzzaman	12	24
5	Hamiduddin Mohammad	Hamiduddin Mohammad	14	22
6	Amirunnisa Piar	Amirunnisa Piar	14	22
7	Akhtarul Imam	Akhtarul Imam	20	16
8	Hasanuddin Ahmed	Ahmed, Hasanuddin	17	19
9	Hayatullah Ansari	Ansari, Hayatu'llah	6	30
10	Kabirul Islam	Kabirul Islam	20	16
11	Kalimuddin Ahmed	Kalimuddin Ahmed	18	18
12	Khairuddin Chaudh- ury	Khairuddin Chaudh- ury	8	28

13	Monirul Hasan	Monirul Hasan	17	19
14	Mohammad Hidayatuh	Hidayatullah Mohammad	15	21
15	Nurul Islam	Nurul Islam	18	18
16	Qurratulain Hyder	Qurratulain Hyder	16	20
17	Sazauddin Ahmed	Ahmed, Sazauddin	17	19
18	Syed Ameruddin	Ameruddin, Syed	8	28

314 Three Worded Names where Third Word may be Takhallus

1	Abdul Kareem Fakcer	Fakcer, Abdul Kareem	11	2	23
2	Abu Sayeed Ayyub	Ayyub, Abu Sayyed	13	3	20
3	Begum Zohra Jabeen	Zohra, Jabeen (Begum)	6	12	18
4	Ghulam Hasan Beg	Beg. Ghulam Hasan	8	2	26
5	Ghulam Mohd Shad	Ghulam Mohd Shad	7	2	27
6	Ghulam Nabi Firaq	Ghulam Nabi Firaq	5	1	30
7	Ghulam Nabi Gauhar	Ghulam Nabi Gauhar	7	1	28
8	Ghulam Nabi Nazir	Nazir, Ghulam Nabi	7	1	28
9	Ghulam Rabbari Tabann	Tabann, Ghulam Rabbri	8	1	27
10	Ghulam Ali Fariq	Ghulam Ali Fariq	8	1	27
11	Imran Nawab Shah	Shah, Imran Nawab	15	3	18
12	Khwaja Ahmed Abbas	Abbas, Khwaja Ahmed	7	3	26
13	Masoom Reza Rahi	Masoom Reza Rahi	8	2	26
14	Mohd Idrish Ali	Ali, Mohd Idrish	9	8	19
15	Mohd. Ahmed Abbas	Abbas, Mohd Ahmed	7	3	26
16	Mohd. Yameen Parvez	Parvez, Mohd Yamin	8	5	23
17	Mohd. Shaik Ali	Shaik Ali, Mohd.	14	6	16
18	Mohd. Zaki Ahmed	Zaki Ahmed, Mohd	14	6	16
19	Narus Saiyed Akhtar	Akhtar, Nuris Sayid	8	1	27
20	Shafi Ahmed Sheriff	Sheriff, Shafi Ahmed	6	1	29
21	Shakeel Ahmed Aassim	Shakeel Ahmed Aasim	9	1	26
22	Sikander Ali Wajd	Wajd, Sikander Ali	9	1	26

23	Taj Begum Renzu	Taj Begum Renuz	9	9	18
24	Asif Ibrahim Currimbhoy	Currimbhoy, Asif Ibrahim	13	4	19
25	Shamsuddin Shams Naviad	Shamshuddin Shams Naviad	6	6	24

315 *Names with Nisbat or Surname or Takhallus or a Word Performing Function of Surname*

S. No.	Author's Name	Author's Choice	Ism	Nisbat	Takh.
1	Abdul Ahad Zargar	Zargar, Abdul Ahad	10	26	NA
2	Abdul Aziz Hanfee	Hanfee, Abdul Aziz	11	25	NA
3	Abdul Gani Abdul Karim Dahiwalā	Dahiwalā, Abdul Gani Abdul Karim	12	24	NA
4	Abdul Hamid Mulla Avicina	Mulla, Abdul Hamid Avicina	9	NA	27
5	Abdul Karim Chand- bhai Qureshi Mu- qabil	Qureshi, Abdul Karim Chandbhai Muqabil	11	11	14
6	Abdul Latiff Ghonghi	Ghonghi, Abdul Latif	11	25	NA
7	Abdul Qavi Desnavi	Desnavi, Abdul Qavi	8	28	NA
8	Abdus Quddus Rasa Javidani	Javidani, Abdus Quddus Rasa	8	23	5
9	Abdul Salam Rehmani	Rehmani, Abdul Salam	9	27	NA
10	Abdur Rab Khan	Abdur Rab Khan	12	24	NA
11	Abdus Sattar Shahidi	Shahidi, Abdus Sattar	7	29	NA
12	Abdus Salam Kidwai	Kidwai, Abdus Salam	5	31	NA
13	Abdul Mohd Abdul Qasim Sahar	Abdul Mohd Abul Qasim Sahar	8	NA	28
14	Abdul Muzaffar Hanfi	Hanfi, Abdul Muzaffar	8	28	NA
15	Ahmad Lal Moham- mad Makrani	Makrani, Ahmed Lal Mohammad	9	27	NA
16	Ahmed Mohammad Ibrahim Azam	Ibrahim, Ahmed Mohammad Azam	15	21	NA

17	Akhlaq Mohd Khan Shahryar	Khan, Akhlaq Mohd, Shahryar	2	4	30
18	Aslam Shah Khan	Khan, Aslam Shah	12	24	NA
19	Ali Jawwad Zaidi	Zaidi, Ali Jawwad	10	26	NA
20	Ali Mohammad Lone	Lone, Ali Moham- mad	10	26	NA
21	Ali Sardar Jafri	Jafri, Ali Sardar	10	26	NA
22	Andaleeb Zehra Kamoonpuri	Kemmoonpuri, Anda- leeb Zehra	10	26	NA
23	Asafali Hussain Saheb Majawar	Majawar, Asafali Hussain	11	25	NA
24	Ayyub Ilahi Mahir Chandpuri	Ayyub Ilahi Mahir Chandpuri	6	26	4
25	Asloob Ahmed Ansari	Ansari, Aslam Ahmed	7	29	NA
26	Bashir Ahmed Mayukh	Bashir Ahmed Mayukh	10	NA	26
27	Esamail Sardar Khan Inamdar	Inamdar, Esmail Sardar Khan	7	29	NA
28	Faqir Mohammad Jamalbhai Mansuri	Mansuri, Faqir Mohammad Jamalbhai	7	29	NA
29	Farid Mohammad Ghulamnabi Adil Mansuri	Mansuri, Farid Moha- mmad Ghulamnabi Adil	7	26	3
30	Fazlur Rehman Hashmi	Fazlur Rehman Hashim	6	28	NA
31	Ghulam Mohammad Mushtaq Kashmiri	Ghulam Mohammad Mushtaq Kashmiri	620	10	
32	Ghulam Nabi Taq Nazir	Ghulam Nabi Taq Nazir	9	5	22
33	Ghulam Rasool Dar Santosh	Ghulam Rasool Dar Santosh	9	6	21
34	Habibullah Hamid Kashmiri	Habibullah Hamid Kashmiri	7	25	4
35	Hasan Jamal Chhipa	Chhipa, Hasan Jamal	9	27	NA
36	Imamuddin Sadrud- din Zahir Dargah- wala	Dargahwala, Immamu- ddin Sadrud- din Zahir	9	16	11
37	Khaliq Ahmed Khan Khaliq Anjum	Khan, Khaliq Ahmed Khaliq Anjum	7	3	26

38	Mohd. Taiyab Hussain Peedit	Hussain, Mohd Taiyab Peedit	14	NA	22
39	Mir Ghulam Rasool Nazki	Mir Ghulam Rasool Nazki	11	NA	25
40	Mirza Mood. Zaman Azurda	Zaman, Mirza Mohd Azurda	11	25	NA
41	Mohammad Valibhai Mankad	Mankad, Moham- mad Valibhai	11	25	NA
42	Mohammad Ramzan Bhat Mashal Sultan- puri	Mohammad Ramzan Bhat Mashal Sultanpuri	11	18	7
43	Mohd Haneef Abdul Kareem Hafeez Malegonvi	Mohd Haneef Abdul Kareem Hafeez Malegonvi	12	17	7
44	Mohd. Rafeeq Kate	Kate, Mohd Rafeeq	10	26	NA
45	Mohd Ziauddin Ansari	Ansari, Mohd Ziaud- din	9	27	NA
46	Moulana Mubarak Kasim Jawahar	Kasim Jawahar, Moulana Mubarak	8	NA	28
47	Nisar Ahmad Faruqi	Faruqi, Nisar Ahmad	4	32	NA
48	Noorul Hasan Ansari	Ansari Noorul Hasan	6	30	NA
49	Packir Masthan Amiz Amja	Amja, Packir Masthan Amiz	9	—	27
50	Qasmiul Haque Gayawi	Gayawi, Qasimul Haque	11	—	25
51	Raahid Ahmed Pahari	Pahari, Rashid Ahmed	12	24	—
52	Samsul Haque Sugata Choudhry	Samsul Haque Sugata Choudhry	6	27	3
53	Sayyed Mohammad Sanaullah Qaiser Qalander	Qalander, Sayyed Mohammad Sanaullah Qaiser	8	NA	28
54	Shah Nasiruddin Mohammad Faridi	Faridi, Shah Nasirud- din Mohammad	7	NA	29
55	Shaikh Mohd Yosuf Noor Mohd Awara	Shaikh Mohd Yosuf Noor Mohd Awara	8	NA	28
56	Sheikh Mohammad Abdul Qausim Siddiqui	Siddiqui, Sheikh Mohammad Abdul Qausim	7	28	1
57	Shujauddin Saajid Shujakhawar	Khawar, Shujauddin Saajid	10	NA	26

58	Syed Ghulam Rasool Shah	Syed Ghulam Rasool Shah	12	24	NA
59	Syed Mohammad Hussain Azimabadi	Hussain, Syed Mohd Azimabadi	15	21	NA
60	Vaikom Mohd Basheer	Basheer, Vaikom Mohd	35	1	NA

32 Survey Result

The sample of Muslim names given to readers is on all India character. Among the responding persons there are 14 teachers, 11 research scholars, 7 librarians and two persons working in other places. Out of these 19 readers can speak, write and read Urdu. The survey reveals the following.

In two worded name, if one word in a holy word like Mohammed, Ahmed, Hasan or Ali, then the second word has more recall value. For example in the names Mohammad Said, Said Mohammad, Ali Said, the word Said will be recall word.

When the name of an author consists on two Isms without a holy word, e.g., Humayun Kabir, Qamar Rais, Shamim Anwar, the 'recall' lies in both the parts of name but slightly in favour of the last part of the name.

When the second part of the name is Nisbat or Takhallus or like these, then the readers' choice favours the last part, e.g., Akbar Hyderi, Zarina Sani and Nafis Afridi.

A compound name conveys a definite meaning and by splitting it, the meaning is lost. A compound name may be written as one word or as two words. Survey shows that splitting of compound names is not desired by majority of readers. In case one more word attached with a compound name as in Haneefuddin Mohamud, Badiuzzan Khawar and Khairuddin Choudhury, then the last word is the most recalled word.

In three worded Ism names, the last part is or seems to be Takhallus as in Ghulam Mohammad Akhtar. In such cases the users' choice of recalled word is in favour of last part.

In the names with Nisbat and or Takhallus or a word performing the function of surname, the survey indicates that these elements are easy to memorise.

33 Conclusion

The quantum of literature from Muslim authors in almost all

branches of knowledge is on the increase every year. The difficulties in cataloguing such documents and their retrieval to users are problems met with. Different codes are followed by various libraries and these provide no solution to the problems. Diverse practice are followed by different libraries, and as a consequence the recall effort of users is influenced.

5 SUGGESTIONS

Indian Muslim names generally consist of the following elements and in the given specified order :

- 1 Khitab
- 2 Laqab
- 3 Ism
- 4 Takhallus
- 5 Nisbat

Khitab and Laqab are removable attachments and may be used, if necessary, for individualising. Out of the last three i.e., Ism, Takhallus and Nisbat, Takhallus is the most potent and 'recalled' word and should get preference over the two. In the absence of Takhallus, Nisbat qualify for entry.

For names that consist of Ism only, we may prescribe that:

- 1 Compound name should not be splitted
- 2 Two worded names should not be inverted: if necessary reference from second part may be given
- 3 In three worded Ism names, the last part may be Takhallus or family name. It may be entered as it is but reference from the last part is desired.

APPENDIX

List of the Muslim authors names given to the readers to determine recall

(W) Against the name the author is woman.

A M Asad Zaidi.	Dahiwalla.
Abdul Ahad Zargar.	Abdul Ghan Khan.
Abdul Aziz Hanfee	Abdul Hamid.
Abdul Gani Abdul Karim	Abdul Hamid Molla Avicina.

Abdul Kareem Fakeer.	awar
Abdul Karim Chandbhai	Asghar Wajahat
Quraishi Muqabil.	Asif Ebrahim Curimbhoy
Abdul Khaliq Tak Zainagiri.	Aslam Allahabadi
Abdul Latif Azm.	Asloob Ahmed Ansari
Abdul Latif Ghonghi	Ayub Prem
Abdul Qavi Desnavi.	Ayyub Ilahi Mahir Chandpuri
Abdul Qudus Rasa Javidani.	
Abdul Rehmed Azad Ganaie.	Badiuzzaman Khawar
Abdul Salam Rehmani.	Baqar Mehdi
Abdul Rab Khan.	Bashir Ahmed Mayukh
Abdus Samad.	Begum Zohra Jabeen (W)
Abdus Sattar.	
Abdus Sattar Shahidi.	Esmail Sardar Khan Inamoar
Abdus Salam Kidwai	
Abid Adeeb.	Fakirmohammad Jamalbhai
Abid Ali Khan.	Mansuri
Abu Mohammad Abdul Qasim	Faridmohammad Ghulamnabi
Sahar.	Adil Mansuri
Abul Muzaffar Hanfi.	Fazlur Rehman Hashmi
Abu Sayeed Ayyub.	
Ahmed Basheer.	G.M. Ansari
Ahmed Lalmohamad Makarani.	Ghulam Hasan Beg
Ahmed M Akhtar.	Ghulam Mohammad Shad
Ahmed Mohammad Ibrahim	Ghulam Mohammad Mushta
Azam.	Kashmiri
Ahmed Salim.	Ghulam Nabi Firaq
Akbar Hyderi.	Ghulam Nabi Gauhar
Akhlaq Mohd Khan Shahryar.	Ghulam Nabi Nazir
Akhtar Ul Iman.	Ghulam Nabi Taq Nazir
Ali-Ahmed Suroor.	Ghulam Rabbani Taban
Alam Shah Khan	Gulam Ali Fariq
Ali Javad Zaidi	Gulan Rasool Dar Santosh
Ali Mohammad Lone	
Ali Sardar Jafri	Habeeb Valapad
Alimunnisa Piar (W)	Habibullah Hamidi Kashmiri
Amina Khatoon (W)	Hafiz Mohamedabdul Kader
Andaleeb Zehra Kamoon-	Syed Anmed
puri (W)	Hameeduddin Mahmud
Anwar Azeem	Hamidullah
Asafali Hussein Saheb Muj-	Hasanuddin Ahmed

Hasan Jamal Chhipa
 Hayatullah Ansari
 Humayun Kabir

Imamuddin Sadruddin Zahir
 Dargah Wala
 Imran Nawab Shah
 Ismat Chugtai

Jamila Brijbhushan
 Jeelani Bano (W)

K. Abdul Gafoor
 K.T. Mohammad
 Kabirur Islam
 Kalimuddin Ahmed
 Karamat Ali
 Khairuddin Choudhury
 Khaliq Ahmed Khan Khaliq
 Anjum
 Khwaja Ahmed Abbas
 Khwaja Ahmed Faruqi

M. Ilimuddin Dewan
 M. Mohammad Anwardeen
 Masud Husain
 Mazhar Imam
 Masoom Reza Rahi
 Manzoora Akhtar (W)
 Manshur Rehman Khan
 Mahalaga Khatoon Siddiqui
 (W)

Md. Idrish Ali
 Md. Kdbad Ali Ahmed
 Md. Qamaruddin Khan
 Md. Taiyab Hussain Peedit
 Mehboob Badai
 Mir Ghulam Rasool Nazki
 Mirza Mohd Zaman Azurdah
 Mirza Mohd Zaman
 Mohammad Ahmed Abbas

Mohammad Ansarullah
 Mohammad Haneef Quraishi
 Kaifi

Mohammad Hasan
 Mohammad Hidayatullah
 Mohammad Valibhal Mankad
 Mohammad Yameen Parvez
 Mohammad Yasin
 Mohammad Zaki Ahmed
 Mohammed Haneef Mohamad
 Salih

Mohammad Shan
 Mohammdd Ramzan Bhat
 Mashalasultanpuri
 Mohamed Zakir
 Mohd. Habib Khan
 Mohd. Haneef Abdul Kareem
 Hafeez Malegaonvi
 Mohd Rafeeq Kate
 Mohd Salim Kidwai
 Mohd Ziauddin Ansari
 Mohiuddin Wain
 Munirul Hussain
 Moulana Musarak Karim
 Jawahar
 Muhammad Mujeeb
 Muhammad Shaik Ali
 Mulla Akbar Ali
 Munawar Naji
 Mushirul Haq
 Mushtaque Ahmed Kazi
 Muzaffar Aazim

N. Mohammad Sheriff
 N.K.A. Latheef
 N.N.A. Idrachimshah
 Nafis Afridi
 Nazrul Islam
 Nisar Ahmed Faruqi
 Nazamuddin
 Noorand Haneef

Noor Shah	Shekh Mohammad Abul
Noorul Hasan Ansari	Quasim Raunad Siddiquee
Nurul Hasan Hashmi	Shujauddin Saajid Shujakha-
Nurul Islam	war
Nurus Sayeed Akhtar	Sikander Ali Wajd
	Syed Abdul Gafoor
Packir Masthan Amir Amja	Syed Abdul Malik
	Syed Abdul Rehman
Qamar Rais	Syed Abdul Hasnath
Qasimul Haque Gayawi	Syed Ali Hashmi Manzoor
Qazi Abdul Sattar	Syed Ali Hashmi
Qurratulain Hyder	Syed Ameeruddin
	Syed Ghulam Rasool Shah
Rashid Ahmed Pahari	Syed I Ziauddin
Raza Ahmed	Syed Mohammad Hasnain
	Azimabadi
S.S. Hassan Aboobacker	Syed Mohammad Mehdi
Saiyed Mohammad Akbar	Syed Tassaduqe Hussain
Sajida Zaidi (W)	Suzauddin Ahmed
Samsul Haque Sugata Chau-	
dhury	Taj Begum Renzu (W)
Sardar Ahmed	Tamarassery Muhammed
Sayyed Mohammad Sanaullah	
Aiser Qalandar	Usman Ahmed Qasmi
Shabbir Hakeem	
Shafi Ahmed Shariff	V A A Azceez
Shafi Shauq	V K Abdul Razack
Shan Nasiruddin Mohammad	Vaikom Muhammad Basheer
Faridi	
Shaikh Mohd Yusuf Noor	Yasin Ahmed Dalal
Mohd Awara	
Shakeel Ahmed Asim	Zaheer Ahmed Siddiqi
Shamim Anwar	Zahida Zaidi (W)
Shamsuddin Shams Navaid	Zakauddin Shayan
Shamsur Rehman Faruqi	Zarina Sami (W)

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4.3 Ranganathan's Canons of Cataloguing and Scientific Method

KRISHAN KUMAR

Describes how the normative principles were introduced by S.R. Ranganathan on his *Theory of Library catalogue* (1938) and *Classified Catalogue Code* (1945) and developed over a period of time. Discusses levels of normative principles. Shows how introduction of canons of cataloguing has led to systematization of the rules in *Classified Catalogue Code*. Discusses how canons take care of the approach of the users. Concludes that application of these canons has led to the establishment of a cycle of scientific method and many of these will sustain themselves for a long time to come.

1 INTRODUCTION

S.R. Ranganathan was a library scientist par excellence. He aimed to apply scientific method to different areas of library science. In the field of cataloguing, he enunciated a set of canons of cataloguing. These canons have been described in detail in his *Classified Catalogue Code*¹ (1964). His catalogue code is based on the normative principles consisting of general normative principles, laws of library science, canons of cataloguing and principles of cataloguing. These normative principles have stood the test of time. Ranganathan's contribution in the form of canons of cataloguing is seminal in nature. Unfortunately, his contribution to cataloguing especially canons of cataloguing is not well known outside India except for his chain procedure.

2 BACKGROUND

Although Ranganathan had formulated the five laws of library science in 1928 and these had appeared in a book form in 1931, these did not influence the formulation of rules

in the first edition of Ranganathan's *Classificated Catalogue Code*² (1934) to any appreciable extent. This edition was largely based on practices of the past and it can not be considered strictly scientific because theory of cataloguing had not developed sufficiently by then. Although it did not employ guiding principles in an explicit manner, there is enough evidence to show their use implicitly.

Between 1934 and 1937, some of the rules of *Classified Catalogue Code* (CCC) (1934) were critically examined by Ranganathan. As a result certain guiding principles of cataloguing took shape. These were named canons of cataloguing and were implications of laws of library science. Thus, Ranganathan succeeded in applying scientific method to cataloguing practice and rules in a catalogue code in 1937.

Ranganathan's *Theory of Library Catalogue*³ was published in 1938. It contains 'general and special principles' given under the heading 'Guiding principles'. The guiding principles listed include law of parsimony, five laws of library science and six canons (canon of consistency, canon of relevancy, canon of ascertainability, canon of permanence, canon of currency and canon of prepotency). These principles meant for guiding theory and practice of cataloguing were at first expounded by him in this work. In this book, Ranganathan used these guiding principles to develop his theory of cataloguing and also applied these principles to the comparative study of rules in the draft of the second edition of Anglo-American Code and first edition of CCC. In addition he applied these principles to the study of specific problems. Thus it was in 1938 that through canons of cataloguing, scientific method was introduced in the field of cataloguing by a published document. Ranganathan started application of guiding principles formulated by him in a systematic manner to the rules of cataloguing in his second edition of CCC⁴, which appeared in 1945. However, these guiding principles were not described in this work. He argued that "This book is only a code of rules. It does not expound the theory of library catalogue" (p. 13). The same was the case with regard to third edition of CCC⁵ (1951).

Ranganathan applied guiding principles to first edition of his *Dictionary Catalogue Code*,⁶ published in 1945. He did not expound the guiding principles in this work. The second

edition⁷ appeared in 1952. It also did not describe the guiding principles.

In 1955, the guiding principles named 'normative principles', were extended and applied effectively to a comparative study of five catalogue codes, in his *Heading and Canons*⁸ (1955). Method of osmosis was suggested to solve the problems relating to change of a catalogue code in a library. The experience gained, thus, was utilized in improving the rules in the next edition of CCC.

The fourth edition of CCC⁹ (1958) contained ⁸four basic laws, five laws of library science and nine canones of cataloguing. Method of osmosis was raised to the status of a principle. This edition embodied the findings of the critical study of cataloguing problems discussed in *Heading and Canons* (1955). CCC (1958) eliminated the need for a separate dictionary catalogue as the necessary alternative rules were provided at appropriate places in the code itself.

The fifth edition of CCC¹⁰ published in 1964, contains four basic laws (Laws of interpretation have been treated as one Law), five laws of library science and eight canons of cataloguing.

In the December 1969 issue of *Library Science with a Slant to Documentation*,¹¹ canon of recall value was further added. This canon has been introduced in *Cataloguing practice*.¹² This has led to major changes in the rendering of the corporate body headings. This canon may be considered a master canon because a number of canons are its corollaries. It will have a profound effect on cataloguing practices.

Table 1 in the succeeding page, presents a complete picture regarding normative principles, indicating how these have developed over a period of time.

3 LEVELS OF NORMATIVE PRINCIPLES

Ranganathan recognized three levels of normative principles, namely, General normative principles, specific normative principles for Library Science and specific normative principles for cataloguing. Each level has its own sphere of application.

TABLE I

	General Normative Principles		Specific Normative Principles			Comments
	Laws of Library Science	Canons of Cataloguing	Principles of Cataloguing			
1	2	3	4	5	6	
CCC (Edition I) (1934)		—	—	Two principles for alphabetization of entries. The principle of 'Paragraph before word' and Principle of 'Section before paragraph'		
Theory of library catalogue (1938)	Law of parsimony	5	6 (Canons of ascertainability, consistency, currency, permanence, prepotency and relevancy)	5	6 (Gestalt theory of alphabetization)	Includes description of canons of cataloguing, which led to application of scientific method to cataloguing. These canons were used to make a comparative study of the draft of the Anglo-American code and CCC (first edition).

Heaping and canons (1955)	Law of impartiality, laws of interpretation, law of parsimony and principle of local variation	5	8 (Canons of ascertainability, consistence, con- text, currency, per- manence, prepo- sition, sought-h'ad- ing or relevance and purity)	Canons of Context and purity were added. Canon of sought heading or canon of relevance. This work employed the term 'normative principles' 'instead of Guiding principles'. The normative principles were used to make a comparative study of five catalogue codes.
CCC (Edition 4) (1958)	Law of impartiality, laws of interpretation, law of parsimony, principle of local variation and principle of osmosis	5	9 (Canons of ascertainability, consistence, context, currency, indivi- dualization, per- manence, prepo- sition, sought head- ing or relevance and purity)	(a) Canon of individualization and principle of osmosis were added. (b) CCC (Edition 2) (1945) and CCC (Edition 3) (1951) did not contain separate description of normative principles. Both contained 'Gestalt theory of alphabeti- zation (c) CCC (Edition 4) applied normative principles explicitly.
CCC (Edition 5) (1964)	Law of impartiality, laws of interpretation, law of symmetry, principle of	5	8 (Canons of ascertainability, consistence, con-	Canon of purity was dropped and law of symmetry was added. Canon of sought <i>Contd.</i>

1	2	3	4	5	6
	local variation and principle of osmosis	5	text, currency, individualization, permanence, prepotence and sought heading)		heading Or Canon of relevance became merely Canon of rough heading.

Note In December 1969 issue of *Library Science with a Slant to Documentation*,¹³ 'Canon of recall value' was added. This canon was introduced by Ranganathan in his *Cataloguing practice*, leading to major changes in the rules.

31 General Normative Principles

Four general laws (Laws of Interpretation, Law of Impartiality, Law of Symmetry, Law of Parsimony) are applicable to any situation. As such, these are also applicable to cataloguing. The rules of a catalogue code should be framed keeping in view, these rules. In addition, Ranganathan formulated two principles, namely, Principle of Local Variation and Principle of Osmosis. The first one emphasises need for a local catalogue code and the second one provides guidance as to how a library collection can be reclassified and recatalogued, if required at a minimum cost, with least inconvenience to the users.

32 Specific Normative Principles for Library Science

Five laws of library science are specific normative principles. These laws can be applied to any problem faced in library science, library service and library practice. These laws are fundamental laws of library science.

33 Specific Normative Principles for Cataloguing

Canons of cataloguing are all implications of the laws of library science, specific to the field of cataloguing. In case of a conflict between canons, an appeal is made to the laws of library science. These serve as a court of appeal. If there is a conflict between the canons of cataloguing and general normative principles, then a compromise can be achieved with the aid of laws of library science. Each canon covers a different aspect and there is no overlapping among them.

4 SYSTEMATIZATION OF THE RULES

In the preparation of a catalogue, we have to prepare different kinds of entries. For each entry, we have to decide about choice, rendering and recording of heading. Similarly, we have to decide about other sections of each entry. Canons of cataloguing also provide us direction in this regard.

41 Choice of Heading

Heading of an entry may consist of any one of the following:

Personal name

Corporate body name
Subject
Title or uniform title
Series

The following canons are applicable for the choice of a heading :

Canon of ascertainability
Canon of consistence
Canon of context
Canon of currency
Canon of permanence
Canon of sought heading

Each canon listed above has its sphere of application. Canon of ascertainability, canon of consistence and canon of context are applicable to all kinds of headings. However canon of permanence is applicable to personal name and corporate body headings only. Similarly canon of currency is limited to subject headings only.

42 Rendering of Heading

The following canons are applicable in the rendering of a heading :

Canon of ascertainability
Canon of consistence
Canon of context
Canon of recall value
Canon of sought heading
Canon of prepotence
Canon of individualization

All the above canons are applicable to all kinds of headings.

5 APPROACH OF USERS

Ranganathan was particular about the approach of the users. Canon of sought heading and Canon of recall value take care of the approach of the users. The Canon of sought heading directs that decision regarding choice and rendering of heading for main and added entries should be based on the fact whether or not a reader or member of library staff is likely to look under it or not. However it must be admitted that it is not always easy for a cataloguer to determine, whether or not a given heading would be a sought one. It is essential that some guidelines should be provided to enable him to take a decision. There is an urgent need for research in this regard.

The canon of recall value was propounded in 1969 as a result of the development research. The idea of recall value was mentioned by Ranganathan in his *Theory of Library Catalogue* (1938) but it was only later on that it was raised to the status of a canon. The canon directs that in rendering the heading of a main entry, the entry element to be chosen should be the one having highest recall value (i.e. highest probability of being called back to memory by a majority of its readers). The canon is applicable for the rendering of names of entities (name of persons and corporate bodies and titles of documents) in the heading of an entry. With all its potentialities, this canon should be accepted with a pinch of salt. In case a library intends to adopt this canon, then this will lead to enormous administrative problems regarding revision of existing catalogues. The basic difficulty faced by a cataloguer is due to subjective basis of the canon. It requires on the part of a cataloguer to make value judgements in the rendering of headings. It must be admitted that it is not always easy to determine the 'highest recall value'. It is just possible that two cataloguers may render the same heading differently. It is yet to be established if the recall value will be uniform in different countries and languages and also valid in all historical times. The handicaps due to value judgements can be solved to a great extent if a set of rules as guidelines are prepared and a vocabulary of terms, based on intensity of recall value is compiled. Ranganathan did provide some guidelines. These guidelines need to be elaborated and tested over a period of time before these can be accepted in general. The guidelines/rules given by Ranganathan

are controversial in nature and these need to be tested on a large scale.

In any case, a computerized catalogue would be in a better position to meet the requirements of canon of recall value and there would be less need for elaborate guidelines.

Canon of Recall value is regarded as a master canon because a number of canons are its corollaries. This canon was the last one to be added. There is need to redefine the set of the canons so that scope of different canons and their relationship can be examined in proper light, keeping in view Principle of unity.

6 REVISION OF A CATALOGUE CODE

Ranganathan believed that a catalogue code should not be a static document. He was of the view that the rules should be revised from time to time, keeping step with the changing context. Thus, a code should be modified/revised to adapt to changes in the context. This is the message of the canon of context, expounded by him. This goes to show that he was a futurist.

7 PRESENT POSITION

In scientific method, there is a never-ending spiral, starting from individual experiences, leading to generalizations, we go through different steps ending up with deductive laws or canons derived from the normative principles. In the light of new experiences, not conforming to deductive laws or canons, we go back again through another cycle. From the description provided in the foregoing paragraphs, it should be clear that such a cycle has now been well established in the field of cataloguing.

Formulation of normative principles especially canons of cataloguing by Ranganathan and their systematic application to cataloguing practice and framing of rules for *Classified catalogue code* have resulted in the application of scientific method. These normative principles are logical and comprehensive in nature. These are universally applicable. This approach has made rules in CCC more logical, systematic and provided longer life to his catalogue code. The normative principles have served as guiding principles and enable the same rule to be

interpreted in the same way by different cataloguers. The normative principles have also provided sound theoretical basis to cataloguing practice.

These normative principles have proved to be useful to cataloguers using CCC in their day to day work. Besides, these have been found to be valuable by researchers engaged in the critical study of a catalogue code or comparative study of catalogue codes.

8 CONCLUSION

Ranganathan's philosophy as contained in his normative principles (laws-canons-principles-postulates) enunciated in different fields of library and information science will continue to guide librarians in the years to come. Many of these will sustain themselves for a long time to come as these have already stood the test of time. This is equally true for specific normative principles for cataloguing (i.e. canons of cataloguing) expounded by him. Ranganathan constantly strived for application of scientific method to cataloguing and did succeed in establishing cycle of scientific method in cataloguing. This itself is a proof of the seminal contribution made by the Father of Library Science in India.

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4.4 Ranganathan's Philosophy of Cataloguing: Application of Scientific Method for Analysing Cataloguing Problems

S G. MAHAJAN

Ranganathan was a Library Scientist. As a scientist, he believed in the spiral of scientific method. During his lifetime, he enunciated Canons, principles, postulates for Cataloguing and Classification. He designed classified catalogue code and colon classification and framed detailed rules for cataloguing and classification. As a true Scientist, he tested his hypotheses from time to time and on the basis of new observations and experimentation, he modified/revised his earlier hypotheses, interpreted rules in a new directions and evolved new theories, postulates and rules discarding the old ones-the Canons of Cataloguing and Classification or Rules in a Catalogue Code or Classification Scheme

In testimony of his statement, the author gives some examples from his correspondence with S. R. Ranganathan during the period from 1964 to 1972 of how Ranganathan responded, in a scientific manner, to the problems posed by him in case of cataloguing of (1) Books by original author and the reviser, (2) Translated books in the main class literature, (3) periodical conferences, and (4) implications of the Canon of Recall Value and (5) Classification of economics.

Suggests that the correspondence of S. R. Ranganathan of such nature be compiled, edited and published with comments wherever necessary.

Stresses the need for establishing a National Body for updating Classified Catalogue Code and Colon Classification.

1 INTRODUCTION

Ranganathan was a Library Scientist. As a scientists, he believed in the spiral of scientific method. During his lifetime, he enunciated canons, principles and postulates for Cataloguing and Classification. He designed classified catalogue code and colon classification and framed detailed rules for cataloguing and classification. As a true scientist, he tested his hypotheses from time to time and on the basis of new observations and

experimentation, he modified/revised his earlier hypotheses, interpreted rules in a new direction and evolved new theories, postulates and rules discarding the old ones the Canons of Cataloguing and Classification or Rules in a Catalogue Code or Classification Scheme.

In testimony of my earlier statement, I am giving below some examples from my correspondence with S.R. Ranganathan during the period from 1964 to 1972 of how Ranganathan responded, in a scientific manner, to the problems posed by me in case of cataloguing of (1) Books by original author and the reviser, (2) Translated books in the main class literature, (3) Periodical conferences, and (4) Implications of the Canon of Recall Value and (5) Classification of economics.

I was teaching the paper 'Cataloguing-Practice' according to CCC. Ed. 4¹ to the Diploma Course in Librarianship of the Poona University during the years 1963-65. Prior to 1963, CCC. Ed. 2 (1945) was followed for teaching this paper. During the course of my teaching, a number of problems came up and remained unsolved. I had prepared catalogue cards for the various categories of books catalogued during the year. These catalogue cards were pasted on foolscap sheets. To the left hand side of the sheets, the problems raised by me were jotted down with some space for answer. These sheets were sent to Ranganathan for checking and guidance. (Letter dated 16 April 1964).²

To my surprise, I received the parcel back within a period of 10 days with answers to each and every question posted by me, along with a letter from Ranganathan (Letter dated 24 April 1964) appreciating the valid points posed by me.

2 PROBLEMS IN CATALOGUING

Entry under Collaborator

According to CCC. Ed 4, the entry under the Reviser (with original author) is prepared as follows:

Ritchie (James), *Rev.*
Thomson (J. Arthur) : Outlines of
Zoology. Ed 9.

K 13

In this example, I pointed out that in the second section of this entry, the title may be written first and then the name of the original author be recorded, instead of writing the name of the original author first. It was my observation that readers ask for the title of the book and not for the original author.³

Dr Ranganathan gave the following reply:⁴

1 We have to be sure of the ways of the majority of readers.

2 The ideal will be to make an elaborate survey of readers' ways in hundreds of libraries in the world and follow the indication of statistics.

3 As it is, we have no means of deciding the issue.

4 Therefore, we forcedly prefer one way.

This reply signifies Ranganathan's belief in scientific method. He prescribes to study the behaviour of majority of readers by undertaking an elaborate survey and to follow the statistical indication.

Cataloguing of Translated Books

In a further letter dated 23 April 1964, I had posed certain difficulties while cataloguing of translated books (Works in the Main Class Literature and Classics).

According to the rules, translations are entered under original author and title (mostly translated title) is to be recorded in the Title Section of the entry.

Consider the following transcript of the Title Page. Chorāvar mor/Somerset Maugham chyā Then & Now yā katheche svair rupāntar/Lekhan/Shri S N Kolhatkar/

This book is a translation of Somerset Maugham's novel 'Then and Now'.

Main Entry is prepared as follows:

0111,3M74,1

155J8

MAUGHAM (William Somerset) (1874).

Chorāvar mor. Tr by Shivaram Narhar

Kolhatkar.

1587

Added Entries

MAUGHAM (William Somerset) (1874).

Chorāvar mor. Tr by Kolhatkar.

0111,3M74,1

155J8

KOLHATKAR (Shivaram Narhar), Tr.

Maugham : Chorāvar mor.

CHORĀVAR MOR.

By Maugham. Tr. by Kolhatkar.

0111,3M74,1

155J8

THEN AND NOW, MAUGHAM (William Somerset).

For documents in this class and its subdivisions, see the classified part of the catalogue under the class Number

0111,3M74,1

Comments. The reader is baffled when he sees the title "Choravar mor" under the author W.S. Maugham. The reader is also confused when he reads the name of Maugham under the fanciful title "Chorāvar mor", and under the name of the translator S.N. Kolhatkar. According to rules of the CCC. Ed 4, there is no provision to mention the original title (Then and Now) in the Main Entry whereas INB and BNB record the original title in the note section as "originally published as "Then and Now". This provision is useful and be incorporated in the next edition of CCC.

Alternative Suggested

CHORAVAR MOR.

By Kolhatkar, Tr.

KOLHATKAR (Shivaram Narhar), Tr.

Choravar mor.

MAUGHAM (William Somerset) (1874).

Then and now. Tr into Marathi as

Choravar mor by S N Kolhatkar.

Question was also raised as to whether it will be desirable to classify this translation in the Class 'English Literature' or in the Class 'Marathi Literature' and further whether this translation be treated as work of the translator. If we treat the translation as the work of the translator, the entries will have to be prepared in a different way.

Ranganathan's Reply

Ranganathan had replied as follows (letter dated—30 April 1964).

- 1 It is a very fine point that you have raised.
- 2 It does include a problem which has not yet been completely solved.
- 3 So far as the translations of literary works are concerned,⁵ there are two courses open. If the translation is valued by the scholars in the translated-into language as having its own individual merits to justify its being regarded as an independent piece of literature in that language though the theme had been taken from some other book, the translator may be taken as the author and the translated title may be taken as the title. The author and the book which is translated, should be given only an Associated Book Entry in the alphabetical part and for this purpose, the main entry should also give an Associated Book-Note.⁶
4. Since you are raising only translations of works in the main class Literature, the solution I have given above is full and should prove satisfactory. I have been following this practice. The existing rules allow this practice.
- 5 What has not been satisfactorily solved is the case of translation of books in other main classes.⁷

23 Cataloguing of Periodical Conferences

In my letter dated 25 October 1966, difficulties in cataloguing of proceedings of conferences held periodically were posed. It was suggested that the place name where the conference is held be mentioned in the Tracing Section. (Holdings Section) of the Main Entry. It was further stressed that an Added Entry be prepared under the place name, as many readers do not remember the serial number of the Conference but the place name as can be seen from the following examples.

Indian National Congress Reports are demanded as follows:

Surat Congress	Lahore Congress
Lucknow Congress	
Library Conferences/Seminars	
Malmo Seminar	Elsinore Conference
Rochester Conference	

Dr. Ranganathan found important points for discussion in this letter. He replied:

1 With regard to the Proceedings of Periodical Conferences, please see Sec. PB 162 of CCC. Ed 5.⁸ It provides for the name

of the place being shown in the Tracing Section.

2 In the case of a printed catalogue, this part of the Tracing Section will have to be replaced by the Holdings Section. In that section, to name the place of every conference would mean half a line for each conference. For example, the Indian National Congress will require 40 or 50 lines. Is it wise to give so much space? Is there any other alternative?

3 This is an important point for discussion. Ganesh Battacharyya, our Lecturer in Cataloguing, will be bringing it up for discussion at one of our Colloquium meetings. Either he or myself will let you know the result in due course.

3 But I do not think it will be practicable to give an added entry to each session of a conference under the name of its place. This will swell the catalogue enormously. On the other hand, if the main card of the conference is located, the desired place of the conference can be easily picked up in one or two sweeps of the eye, from the back of the main card.

5 This respect for the Law of Parsimony is necessary in a library which has got many runs of Conference Proceedings.

6 But in a library which has got only one or two sets, the Law of Local Variation can be availed of by that library, to put in the added entries suggested by you.

7 This point also will be discussed in our Colloquium.

PS—We have now discovered further that Section PB15 “Holdings Section” is out of place in Chapter PB. It should have been transferred to Chap RD. This is my conjecture. We shall examine this also thoroughly at our Colloquium.

Accordingly this problem was discussed in a Colloquium of DRTC on 7 Dec. 1966. As a result of these discussions, a number of amendments to the rules in CCC. Ed 5 were made. This discussion has been presented in a paper “Names of the places of a Periodical Conference.”⁹ (Cataloguing problems 2) by S.R. Ranganathan and G. Bhattacharyya in *Library Science with a Slant to Documentation*. V. 4 1967 Paper J. pp. 178-194. Following are the important amendments:¹⁰

1 The name: *Holdings-in-Brief* Section has been given to the Fourth Section of the Main Entry.

2 Details of Conferences held (Serial number, place name, year, Book No., Acc. No.) are to be given in *Holdings-in-Full* Section. Continued cards are to be used for this section.¹¹

3 Details of conferences held be not written in the Tracing Section.

24 Canon of Recall Value

Ranganathan enunciated his latest "Canon of Recall Value" in 1968. According to this Canon, choice of a heading for multiworded name of a corporate body, be made under the word or word-group which has greatest recall value. This canon was discussed in a Seminar on Cataloguing held from May 24 to 31, 1970 at DRTC, Bangalore. During the Seminar it was suggested that investigations be carried out in different libraries to examine the implications of the Canon of Recall Value, particularly in regard to readers' reactions to the changes in cataloguing practice (letter dated 4 July 1970). Accordingly, an experiment was carried out by me and Prof D.W. Shewde, Dept. of Library and Information Science, Poona University and the results of the experiment were sent to Dr Ranganathan. Similar experiments were carried out by various librarians in the country, and based on the feedback received from these experiments, Ranganathan finalised the rules in CCC.

25 Classification of Economics

Edition 7 of the Colon Classification was in preparation in 1971. Ranganathan had made a number of modifications in the schedules for the main subject 'Economics'. In order to assess the reaction of the majority of the users, Ranganathan prepared a list of 45 subjects in Economics into two blocks—Economics-in-Theory, Economics-in-Action and a second list intermixing the two kinds of subjects. (Letter dated 16 June 1972). This list was circulated among the users of the Jayakar Library as well as that of Gokhale Institute of Politics and Economics, Pune and the reaction of the users in this respect was communicated to Ranganathan.

In a number of cases, many suggestions were accepted by Ranganathan. For example, the suggestion to prepare an entry under the Chairman of an Adhoc-Committee or Commission and to record the name of the Chairman of the Committee, in the main entry as well as in the added entry, was accepted and was incorporated in Ed 5 of CCC. Secondly, my suggestion to add the name of the Ph.D. guide as collaborator in an entry for an unpublished thesis was also accepted ¹²

3 CONCLUSION

From the above discussion, I have to conclude that Ranganathan relied on the spirit of scientific method and found solutions to cataloguing problems. From the feedback received from the users, like me, he revised the rules in the Classified Catalogue Code resulting into deletion of some of the obsolete rules. He was amenable to change.

31 *Suggestions for Consideration*

Above discussion leads to a proposition that there should be a standing committee for revision of Classified Catalogue Code which will take into account new modes of printing and publishing in the book world and to amend the Classified Catalogue Code from time to time to meet the changing needs of the users.

It is also suggested that the correspondence of S.R. Ranganathan (similar to that has been quoted in this paper) be collected, edited and published for the benefit of the Library Scientists. We can find his philosophy as well as method for analysing and solving the problems in Library Science. Such publication will be a valuable addition to the books on research in Library and Information Science.

REFERENCES

- 1 Ranganathan, S.R., *Classified catalogue code with additional rules for Dictionary Catalogue Code*. Ed 4. Madras, Madras Library Association, 1958.
 - 2 Letter from S.G. Mahajan to S.R. Ranganathan dated 16 April 1964. All these letters quoted in this paper, are possessed by the author.
 - 3 Alternative proposed by me, Ritchie (James), *Rev. Outlines of zoology*. by Thomson. Ed 9.
- My solution is similar to example no. 106, (AACR 2 Rule 21.30D Editors and Compilers) option under—Shugrue, Michael.
(*In Examples illustrating AACR 2.* by Eric J Hunter and Nicholas J. Fox. London, The Library Association : 1980 p. 171, col 2).
- 4 Cataloguing Sheets. Sheet No. 17, Remarks.
 - 5 Compare AACR 1 Rule 15.A Translator or Author.
A. Enter a translation of a work under the author of the original work. Make an added entry under the translator according to the provisions of 33E.

- If the translation involves adaptation or is described as a "free" translation, however, treat it as an adaptation. (see rule 7).
- 6 Compare rules from AACR 2. 21.9 and 21.10. Adaptation under the heading for the adapter as it has substantially changed the content of the original work. Some rules can be applied to translations having separate identity. See also example on 30 *In Examples illustrating AACR2*. 1980. p 64 Col 1.
 - 7 Compare rules from AACR 2. Translation entered under heading appropriate to the original 21.14A. For works created before 1501, title in original language is used as Uniform Title—25.4A. Language added if different from original—25.5D. See example on 86 *In Examples illustrating AACR 2*. 1980. p. 81, Col 2.
 - 8 Ranganathan, S.R., *Classified Catalogue Code with additional rules for Dictionary Catalogue Code*. Ed 5. Bombay, Asia Publishing House, 1964. Reprinted 1965.
 - 9 Ranganathan, S.R., and Bhattacharyya, G., *Names of the Places of a Periodical Conference (Cataloguing problems 2)*. Lib Sc; 4; 1967; Paper J. pp 178-194.
 - 10 AACR 1 Rule 163. Holdings. A.1 prescribes to give statement of Volumes held by the library with various qualifications. These provisions are inadequate to give information of all the volumes, along with the accession numbers and book numbers.
 - 11 Compare rules from AACR 2 Conferences as corporate body 21.1B1. Words denoting number omitted from heading for conference—24.7A. Number, place and date added to heading—24.7B1. See examples nos. 77, 165 *In Examples illustrating AACR2*, 1980.
- These examples indicate that separate cards be prepared for each and every year the conference is held. This will swell the catalogue enormously. The provisions of CCC Ed [6] Holdings-in-Brief Section and Holdings-in-Full Section are better than provisions in AACR 1 and AACR 2.
- 12 Mahajan, S.G., *Cataloguing of unpublished Thesis*, *Herald of Library Science*, 9(2) April 1970, pp. 122-127.

4.5 Conceptual Structures Common to the Classified Catalogue Code and the Anglo- American Cataloguing Rules, 2nd Edition, 1978: A Survey and Observations

VENBAKKAM K. SUBRAMANIYAN

Analyses the concepts of the Canon of Ascertainability, Canon of Prepotence, Canon of Individualisation, Canon of Currency and Canon of Consistence, Laws of interpretation, Principle of local variation, Principle of osmosis, Centralised cataloguing and printing of cards and Pre-natal cataloguing. Studies the Canon of Individualisation and its applications to the name of person, geographical, including jurisdictional, name, corporate body, institution, conference, title, uniform title, series, serial, with examples from CCC and AA2. Analyses the concepts of classic, isolates, types of references, book index entry, multi-volumed book, union catalogue, national bibliography, indexing, tracing, and new kinds of documents. Highlights the striking parallels between CCC and AA2. Salutes Dr Ranganathan's concepts that were far ahead of his times.

Preamble

W.C. Berwick Sayers in his Manual of classification hailed the CCC "by far the largest contribution to the subject". "The single most important contribution of this edition of AA2 (Anglo-American Cataloguing Rules, 2nd ed., 1978) to meeting the needs of machine processing, resides in the achievement of an integrated and standardized framework for the systematic description of all library materials . . . contribution to the development of an international cataloguing code." Let us look at the CCC canons.

1 CANONS OF CATALOGUING

11 Canon of Ascertainability

This canon prescribes that the information found in the title-page of the document catalogued and its over-flow pages should determine the choice and rendering of: (1) each section of the main entry other than the extract note, the extraction note, and

the related book note; (2) each section of cross reference entry in CCC and subject analytical in Dictionary Catalogue; (3) the heading of each book index entry; (4) all sections other than the heading and the direction section of each book index entry; and (5) all sections other than the heading and direction section of a class index entry in CC and specific subject entry and see also entry in DC.

In the cataloguing of printed materials, the role of the title-page is central and crucial. To quote the CCC, "the title-leaf and its over-flow leaves in the material plane and Canon of Ascertainability in the idea plane—the plane of normative principles—should be made the sheet anchor of any cataloguing code." The glossary of AA2 has this to say: A page at the beginning of an item bearing the title proper and usually, though not necessarily, the statement of responsibility and the data relating to the publication. The leaf bearing the title page is commonly called the title page although properly called the title leaf. Prefer information found in that chief source to information found elsewhere. When the other sources of information are placed in a ranking order by specific chapters, follow that order. Prescribed sources of information for books, pamphlets, and printed sheets:

<i>Area</i>	<i>Prescribed sources of information</i>
Title and statement of responsibility	Title page
Edition	Title page, other preliminaries and colophon
Material (or type of publication) specific details	
This area is used in the description of	Chief source of information
(1) cartographic materials and called mathematical data; and	accompanying printed material
(2) in the description of serials and called numeric, and/or alphabetic, chronological or other designation, Publication, distribution, etc.	Chief source of information, other preliminaries, and colophon
	Title page (Chief source of information), other preliminaries, and colophon.
Physical description	The whole publication
Series	The whole publication
Note	Any source
Standard number and terms of availability	Any source

12 Canon of Prepotence

The principle that: (1) the potency to decide the position of an entry among the various entries in a catalogue should, if possible, be concentrated totally in the leading section; and even there (2) it should be concentrated, as much as possible, in the entry element; and further (3) if the total concentration in the leading section is not possible, the minimum possible potency should be allowed to overflow beyond it to later sections; and (4) even this spill-over should be distributed in the later sections in a decreasing sequence of intensity. The Canon of Prepotence yields an important deduced statistical principle applicable to the choice of an entry element in a multi-worded heading. "The entry element should be chosen from among that group of words, occurring in the multi-worded term chosen for use as heading, that is more numerous than the group of the other words occurring in it. For the probability for the same word to be used as entry element in several headings is inversely proportional to the numerousness of the group from which the word is chosen; and the smaller this probability, the greater will be concentration of potency in the entry element. This statistical principle is responsible—unconscious though it might have been—for the choice of the family name as the entry element in the rendering Western name—of—person in a heading." This principle is the sheet anchor for the choice of entry element for personal names in the Western world. "It is the overlooking of this statistical principle that has vitiated the AA's prescription of place name as entry element for Institution-heading in spite of its having accepted the place name as the entry element in the name of the government as improvised by cataloguing convention." AA2 has abandoned this vitiating rule and institutions are accorded a treatment similar to that of corporate bodies. "Many universities and governments have established their own series. They are generally given common names, such as Publication series, Library science series, English series, etc. These names do not have sufficient potency. They often become homonyms. To resolve the homonym and to increase the potency, the name of the university of the government or even a department of either, may be added. If the purpose is merely individualisation, the name can be added at the end. But if the purpose is increasing the potency of the heading, the name should be added at the front." In the application of this canon, CCC and AA2 strike

out different paths: while CCC lays great stress on prepotence in the form of its headings, AA2 does on individualisation.

13 Canon of Individualisation

The principle that the name of any entity—be it a person, a geographical entity, or a corporate body, or a series, a document, a subject, or a language—used as the heading for a catalogue entry should be made to denote one and only one entity by adding to it the necessary and sufficient number of individualising elements. The incredibly striking parallels in the application of this canon in CCC and AA2 are discussed in detail in a later part of this paper

14 Canon of Sought-Heading

The principle that the decision whether an entry (1) with a particular type of heading; or (2) with a particular choice for that heading; or (3) with a particular rendering of that choice; or (4) a particular added entry arising out of it should be based on the answer to the question: "Is reader or library staff likely to look for a book under the particular type or choice or rendering of heading or to the particular added entry." The apparent freedom given by this canon should be used with great circumspection, care and judgement. The Canon of Ascertainability is indifferent as to which can be allowed the claim to become a heading. All that it is concerned with is that no element outside the title-page and its over-flow should be allowed to become the heading of a main entry or any other entry under its sway. It is the business of Canon of Sought-Heading to admit or reject the claim of any element in the title page and its over-flow to become a heading. The concept of pseudo-series, many of the statements in the notes area, extract note, extraction note, translation note, summary note and merger note owe their origin to this canon.

Cross references: A reader might remember an author or a collaborator by only one of the names used by him as alternative name or variant forms of one and the same name in different documents. Some of these may be real and some pseudonyms. Whatever may be the names sought by the reader, the catalogue should inform him of all the documents written by him under other names too.

This canon's parallels in AA2: Prefer information found in the chief source to information found elsewhere. Choose as the

basis of the heading for a person, the name by which he or she is commonly known. This may be the person's real name, pseudonym, title of nobility, nickname, initials, or other appellations. Determine the name by which a person is commonly known from the chief source of information of works by that person issued in his or her language. If a person works in a nonverbal context (painter, musician, sculptor, etc.) determine the name by which he or she is commonly known from reference sources issued in his or her language or country of residence or activity. Use the English form of the name of a place if there is one in general use. Determine this from gazetteers and other reference sources published in English-speaking countries. In case of doubt, use the vernacular form. Enter a corporate body directly under the name by which it is predominantly identified. Determine the form of name of a corporate body from items issued by that body in its language or reference sources. If the name of a corporate body consists of or contains initials, omit or include full stops and other marks of punctuation according to the predominant usage of the body. Use the conventional name of a government unless the official name is in common use. The conventional name is the geographic name of the area (country, state, county, municipality, etc.) over which the government exercises jurisdiction. If all the works by a person appear under one pseudonym, or if the person is predominantly identified in reference sources by one pseudonym, choose the pseudonym. If the real name is known, make a reference from the real name to the pseudonym. If a person using pseudonyms is not known predominantly by one name, choose as the basis for the heading for each item the name appearing in it. Make references to connect the names.

15 Canon of Context

The principle that the rules of a CC should be formulated in the context of: (1) the nature of the cataloguing features of the book, prevalent in the mode of book production; (2) the nature of the organisation of libraries prevalent in regard to the mode and quality of library service; (3) the coming into existence of published bibliographies and particularly bibliographical periodicals; and (4) that the rules should be amended from time to time to keep step with changes in the context. At this stage of printing and publishing, for a service library implementing "open access", this canon would reject the inclusion

of publication, distribution, etc., collation and price. The tremendous turbulence in the universe of knowledge of today throws a heavy burden on the library profession engaged in literature-search. The search has to be expeditious. To discharge this new function, the library profession has to throw a new burden on the library catalogues. Subject analyticals have to be multiplied to highlight micro thought embodied in articles in periodicals and portions of books.

To cope successfully with this increasing demand, AA2 devotes an entire chapter (chapter 13) to detail the various ways of preparing bibliographical records that describe a part or parts of a larger item.

16 Canon of Permanence

The principle that no element in an entry, the heading in particular, should be subjected to change by the rules of a catalogue code except when the rules themselves are changed in response to the Canon of Context. In AA2, the determination of the personal name heading from among variant forms found in the item and in the items available in the library if documented by more than 80 per cent of items; from among various forms in more than one language, if documented by more than 50 per cent of items; to base the description of a serial on the first number published or the earliest number available are efforts to adhere to this canon.

17 Canon of Currency

The principle that the term used to denote a subject in a class index entry of a CC and in a subject entry of a DC should be the one in current use. This canon has almost unrestricted sway in AA2, in the choice of personal names, place names, jurisdictional headings, corporate bodies and subject headings. AA2 22.2: If a person is known by more than one name, choose the name by which he is clearly most commonly known. Otherwise, choose one name or form of name in the following order of preference; (1) the name that appears most frequently in the person's works; (2) the name that appears most frequently in reference sources; (3) the latest name: Vivekananda, Swami, not Narendra Datta; Varanasi, not Benares; Kanchipuram, not Conjeevaram; Sri Lanka, not Ceylon.

18 Canon of Consistence

The principle that the rules of a catalogue code should provide

for all the added entries of a document to be consistent with its main entry and the entries of all documents should be consistent with one another in certain essentials such as choice, rendering, and style of writing the heading and the other sections. This canon is followed in toto by AA2 in developing description for any item taken up for cataloguing, in the choice and form of main entries, added entries and cross references. This, in no way, is surprising as the basis for Part I of AA2 which deals with the provision of information describing the item being catalogued, is the development of International Standard Bibliographic Description (Monograph) in 1974 and the International Standard Bibliographic Description (General) in 1977 by IFLA which prescribe the order of elements in a record, a standard set of data elements, and standard punctuation; and Part II which deals with the determination and establishment of headings or access points in the catalogue, under which the descriptive information is to be presented to catalogue users and with the making of references to these headings, is based on Statement of Principles Adopted at the International Conference on Cataloguing Principles, Paris, October 1961. All of us remember with profound gratitude Dr Ranganathan's signal contribution to the deliberations of the Conference, participating in his personal capacity. To cite two instances: the punctuation mark used in AA2 to separate title from statement of responsibility is diagonal slash with space on either side. This is used consistently wherever applicable, be it the title and statement of responsibility area, edition area, series area or notes area:

Language studies/by S; Aram.—3rd ed./revised by S. Ravindran and S. Narendran.—Kanchipuram: Mani Associates, 1985.

313 p.—21 cm.—(Research studies/Ponnammal Foundation; no. 3)

Based on: Language communication studies/K. Ramaswami.

Uniform titles under personal names or corporate bodies or jurisdictions are enclosed in square brackets:

Paratiyar, 1882-1921.

India.

[Poems. Selections. 1985]

[Constitution 1950]

19 *Laws of Interpretation*

A new cataloguing problem created by a document may have to be met by a proper interpretation of the rules in the catalogue code. The rule interpretations of AA2 are published in

Cataloguing Service Bulletin, a quarterly of the Library of Congress, Washington, D.C.

2 PRINCIPLES OF CATALOGUING

21 *Principle of Local Variation*

One of the areas where this principle is applied, is cataloguing. Dr Ranganathan advised the Central Secretariat Library to stand occasionally used materials (annual reports of governments and United Nations) on the shelves or in vertical files "self-catalogued." At the same time, these materials should be properly classified and catalogued in a research library, such as that of the Gokhale Institute, where they form the very basis of the institute's research work.

AA2: The necessity for judgement and interpretation by the cataloguer is recognised in these rules. Such judgement and interpretation may be based on the requirements of a particular catalogue or upon the use of the items being catalogued. The need for judgement is indicated in these rules by words and phrases: if appropriate, if necessary, if considered important by the cataloguing agency, and optionally. These indicate recognition of the fact that uniform legislation for all types and sizes of catalogues is neither possible nor desirable and encourages the application of individual judgement based upon specific local knowledge. This statement in no way contradicts the value of standardisation. Such judgements must be applied consistently within a particular context and must be recorded by the cataloguing agency. The international cataloguing code gives only a general blueprint as it were. AA2 1.0D offers a choice of three levels of description, minimum, standard and full to match the varying types of libraries or usage of library materials of sizes of collections. Another case in point would be the cataloguing decision on "fleeting" material or ephemera.

22 *Principle of Osmosis*

The principle that, when a change in the cataloguing code or in the scheme of classification becomes necessary in deference to the Canon of Context, on and after a chosen date, all the new accessions be catalogued and classified according to the new catalogue code and the new scheme of classification: just those of the old collection as are known to be in much use be recatalogued and reclassified. When AA2 was implemented by

libraries in USA, United Kingdom, Canada, Australia, and other countries on January 2, 1980, most of the libraries chose to freeze their old catalogues and inaugurate new ones with AA2 entries.

23 Corporate Body

Sense 1: A number of persons taken collectively—usually as united, or organised, or coming together informally in a common cause or for common action such as governmental business, or commercial or industrial or service or political or any other business or for deliberation, or for collective expression of opinion or statement. **Sense 2:** A number of corporate bodies taken collectively—usually as united or organised or coming together informally in a common cause or for common action such as governmental business, or commercial or industrial or service or political or any other business or for deliberation, or for collective expression of opinion or statement.

Now, a look at AA2 definition:

A corporate body is an organisation or a group of persons that is identified by a particular name and that acts, or may act, as an entity. Typical examples of corporate bodies: associations, institutions, business firms, non-profit enterprises, governments, government agencies, projects, programmes, religious bodies, local churches, and conferences.

Organ of a corporate body: non-autonomous part of a corporate body formed by 1. the constitution of the parent body or 2. a legislative, executive, or administrative measure, for administrative or deliberative work for an indefinite period, within the field of function of the parent body; or 3. a legislative, or executive, or administrative measure for a specific piece of work for specified duration, within the field of the function of the parent body. This has its parallels in 24.13 and 24.18 of AA2.

24.13: Enter a subordinate or related body as a subheading of the name of the body to which it is subordinate or related if its name belongs to one or more of the following types: 1. A name that contains a term that by definition implies that the body is part of another. 2. A name that contains a word normally implying administrative subordination, providing the name of the higher body is required for the identification or the subordinate body. 3. A name that has been, or is likely to be, used by another higher body for one of its subordinate or related bodies. 4. A name of a university faculty, school, college,

institute, laboratory, etc., that simply indicates a particular field of study. 5. A name that includes the entire name of the higher or related body

24.18: Government agencies entered subordinately:

1-3: Same as those of 24.13. 4. An agency that is a ministry or similar major executive agency as defined by official publications of the government in question. 5. Legislative bodies. 6. Courts. 7. Principal armed services. 8. Chiefs of state and heads of government. 9. Embassies, consulates, etc. 10. Delegations to international and inter-governmental bodies: e.g. Great Britain Delegation to the United Nations.

24 Edition

In sense 1. One of the different printings or reproductions of a document with or without slight change in thought-content, each being distinguished from the others, either numerically or by some other equivalent term such "New", "Revised", and "Enlarged". In sense 2. One of the different forms in which one and the same work is published, each form having a distinctive name almost amounting to a proper noun—Arden Edition, Variorum Edition, Memorial Edition, and Loeb Classics. AA2 Glossary on edition: In the case of books and booklike materials, all those copies of an item produced from substantially the same type image, whether by direct contact or by photographic methods. Edition in sense 2, though not covered by this definition, is nonetheless treated as edition statement.

3 INDIVIDUALISATION

Name of person: The rendering of a title-page name consisting of one and only one fully spelt-out word, though preceded by initials, is to write the fully spelt-out word as the entry element and to write the expansion of the initials as the secondary element. Each library has to make its local rule authorising the initials alone to be written as the secondary element, in case their expansion is beyond the means and the homonyms arising, if any, can be resolved in some other convenient way. The year of birth of the person is to be added as a further individualising element, after the secondary element: Ranganathan (Shiyali Ramamrita) (1892)

AA2: Ranganathan, S.R. (Shiyali Ramamrita), 1892-1972

One more example may be of interest:

Smith, J. (John), 1900 Jan. 10—

Smith, J. (John), 1900 March 15—

same name, same year of birth; individualising element: date and month of birth.

Geographical name: The name of the geographical entity is to be written in the favoured language of the library, if it has a name in that language. It is interesting to contrast AA2 1.0E devoted to language and script of description (retain the language and script of the item in the title and statement of responsibility, edition, publication and distribution, etc., and series areas) with the detailed provisions in CCC for favoured language, non-favoured language, proper nouns, titles, polyglot titles, favoured script, and transliteration which end with a plea for the development of transliteration tables for Western languages to India languages and among Indic languages. The plea still remains unfulfilled!

Areas outside one another. If two or more geographical entities have the same name and lie in different countries, the individualising element for resolving the homonym is to be the name of the country in which it lies, except that it may be omitted if it is in the country of the library: Uxbridge (United States of America). If two or more geographical entities have the same name and lie within the same country but lie outside one another, the individualising element for resolving the homonym is to be the name of the largest geographical area among the areas of the constituent states, countries, districts, taluks, etc. containing the geographical entity and sufficient to individualise it: Sattanur (*Kumbakonam*); Sattanur (*Thanjavur*) underlined words are names of taluks; Tiruvalangadu (*Chingleput*), Tiruvalangadu (*Thanjavur*). Italicised words are names of districts.

CCC

Salem (India)
Salem (New Jersey)
Salem (Ohio)
Salem (Oregon)
Salem (Virginia)

AA2

Tiruvalangadu (Chingleput District, India)
Tiruvalangadu (Thanjavur District, India)
Salem (India)
Salem (N.J.)
Salem (Ohio)
Salem (Va.)

If two or more geographical entities have the same name and lie within one another in succession, the individualising element

for resolving the homonym is to be the name of the state, district, country, taluk, city, borough, town, village, etc.

CCC
 Mysore—This one denotes the state
 Mysore (District)
 Mysore (Taluk)
 Mysore (City)

AA2
 Mysore (India State)
 Mysore (India District)
 Mysore (India Taluk)
 Mysore (India)

Now a look at the provisions of AA2 23 & 24.6 under which these illustrations were constructed.

Additions to place names: If a place is in a state, province, or territory of Australia, Canada, Malaysia, United States, the USSR, Yugoslavia, add the name of the state, province, or territory in which it is located. If a place is in England, Wales, or the Republic of Ireland, add the name of the country in which it is located. Other places: Add to the names of places the name of the country: Paris (France); New Delhi (India).

AA2 24.6. Add the type of jurisdiction in English if other than a city or town. If there is no English equivalent for the vernacular term, use the vernacular term:

Madurai (India : Taluk); Madurai (India : District); Madurai (India) Alternative names: India has the alternative name "Bharat" according to the Constitution of India Act. But India is now being recognized as the standard name in most of the publications and in the Gazetteer. Therefore India should be written in any subject heading or any specific book heading and Bharat only in a cross reference index entry. AA2 24.3E: Governments: Use the conventional name of the government, unless the official name is in common use: France, not Republique Francaise; Arlington, not Town of Arlington. Dr Ranganathan on government: If the corporate body is a government as a whole, its name is to be the name of its territory: India; Mysore (District). The name of the government is thus established artificially by a cataloguing code. In the document itself, it may occur in a form such as "Government of India".

Current geographical name. If a geographical entity has had different names at different times, the name current at the time of cataloguing is to be used in subject heading. It may be mentioned here that the headings in the documents catalogued earlier need not be changed. This is to satisfy the Canon of Permanence. Cross reference index entry is to be given for each of the other items used in the catalogue entries in order to

satisfy the Canon of Currency It may be stated that in an author heading, the Canon of Ascertainability is to determine the name. Application of these provisions result in see also reference entries in both the codes.

Head of the government The rendering of the name of the head of a government used as second heading, is to be provided with the name of the occupant of that office as an individualising element

CCC	AA2
Great Britain, Crown (Elizabeth II)	Great Britain—Sovereign (1952—Elizabeth II)
India—President (Jawaharlal Prasad)	India—President (1950-1958 Rajendra Prasad)

It must be remembered that this kind of corporate heading is to be used only in the case of official publications such as messages, proclamations, decrees, ordinances, and so on, emanating from the head of the government. This kind of heading is not applicable to works written by a king, president, etc. in his private capacity. AA2 21.4D1 Enter under the corporate heading for the official communications from heads of state, heads of government, and heads of international bodies (e.g. messages to legislatures, proclamations and executive orders).

Subordinate courts of law If two or more courts of law of the same government have similar names, the individualising element for resolving the homonym is to be, in sequence of preference, a term denoting either 1 the area of jurisdiction or 2 the headquarters or 3 any other necessary and sufficient attribute

CCC	AA2
Tamil Nadu District Court (Coimbatore)	Tamil Nadu (India) District Court (Coimbatore)
United States of America, Circuit Court of Appeals (Third Circuit)	United States—Court of Appeals (3rd Circuit)

Administrative department The entry element in the name of an administrative department of a government is to be the word or word-group denoting its sphere of work. It should, if possible, be reduced to a noun form in the nominative case. The other words in the name of the department are to be deemed to form secondary element

India, Finance (Ministry of—)	India—Ministry of Finance. x India. Finance, Ministry of
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United States of America,
Education (Bureau of)

United States. Bureau of Education.
× United States. Education,
Bureau of

Interpolation of subheadings. If the administrative department is an organ of second or later remove and if the name is not individualising or if a homonym cannot be resolved without the addition of the name(s) of the organ(s) of earlier remove in its hierarchy, such name(s) is (are) to be interpolated as subheading(s) between the name of the government as a whole and of the name of the administrative department in question. The minimum number of such subheadings is to be interpolated. If the number of such subheadings is two or more, they should be inserted in their descending hierarchical sequence:

CCC
Tamil Nadu, Legislative Assembly,
Accounts (Public—Committee)
United States of America, Treasury
(Department), Accounts (Bureau
of—)

AA2
Tamil Nadu, Legislature, Assembly.
Public Accounts Committee.
United States, Bureau of Accounts.

AA2 24.19: Direct or indirect subheading. Enter an agency belonging to one or more of the types listed in 24.18 as a direct subheading of the heading for the government unless the name of the agency has been, or is likely to be, used by another agency entered under the name of the same government. In that case, add, between the name of the government and the name of the agency, the name of the lowest element in the hierarchy that will distinguish between the agencies.

AA2 and CCC approach the problem from opposite sides, but arrive at the same set of instructions.

Individualising element for a temporary organ of a government: Its year of formation is to be added as an individualising element. In the case of adhoc commissions, etc., the name of the chairman is to be added within circular brackets after the individualising element in the following style:

India, Finance (Commission (1956) (Chairman: Kasturi Santhanam) AA2: India, Finance Commission. The name of the chairman is given in the body or as a note if the statement is prominently displayed and an added entry is made.

Joint Committees/Commissions. In the case of common organ set up jointly by two or more governments, its name is to be preceded by the names of the governments setting it up and a

conjunction is to connect them:

United states and Germany, Claims (Mixed—Commission)
 (19) India, Lok Sabha and Rajya Sabha, National Bank Bill
 (Joint Committee on—) (19) The parallels for this in AA2
 24.15A: Joint Committees, Commissions, etc.: Enter a body
 made up of representatives of two or more other bodies under
 its own name: Claims Commission. 25.15B: If the parent bodies
 are entered as subheadings of a common higher body, enter the
 joint unit as a subordinate body.

India. Parliament. Joint Committee on National Bank Bill.

Institutions Individualising element: If the name of an institution does not individualise it, the individualising element to be used for resolving the homonym is to be the term denoting its 1. place, if it is a localized institution; 2. country, if it has a national status; 3. constituent state, county, district, taluk, etc. if it is a state country, district, taluk, etc. institution; and 4. headquarters, if it cannot be individualised conveniently by any of the terms mentioned in 1-3 above.

AA2 24.4C2: If a body has a character that is national, state provincial, etc., add the name of the country, state, province, etc., in which it is located. 24.403: In the case of all other bodies, add the name of the local place in which the body is located or that is commonly associated with its name, unless the name of an institution, the date(s) of the body, or other designation provides better identification.

CCC
 Labour Party (Canada)
 National Research Council
 (Japan)
 Landholders' Association (Thanjavur)
 Landholders' Association (Thanjavur, Taluk)
 Hindu High School (Triplicane)

AA2
 Labour Party (Canada)
 National Research Council
 (Japan)
 Landholders' Association (Thanjavur, India)
 Landholders' Association (Thanjavur, Taluk, India)
 Hindu High School (Triplicane, Madras, India)

If the individualising element prescribed earlier and/or the presence of the name of a place or of a person as an integral part of the name of the institution does not completely resolve the homonym, the year of foundation of the institution is to be used as a second individualising element:

CCC	AA2
Cincinnati Medical Society (1851)	Cincinnati Medical Society (1851)

AA2 24.4010 If the place name of institution, or date(s) is insufficient or inappropriate for distinguishing between two or more bodies, add an appropriate general designation in English

Church of God (Adventist)

Church of God (Apostolic)

Conference

Individualising element The name(s) of the place(s) of a conference and its year are to be added as individualising elements to the name of the conference which is not held periodically. Diplomatic conference The name of the place of a diplomatic conference is to be prefixed to the name of the conference not held periodically, so as to form a word-group, if it is not already in the name of the conference, and the year (s) of the conference is (are) to be added as individualising element

AA2 24.7B1 Additions to conferences, congresses, meetings, etc. Add to conference, etc., headings (including headings for conferences entered subordinately) the number of the conference, etc., the year, and [the place in which it was held. Individualising elements as in CCC, are enclosed in parentheses, but in a single set

CCC	AA2
Besant Memorial meeting (Madras) (1933)	Besant memorial Meeting (1933 Madras India)
Conference of orientalist (Simla) (1911)	Conference of Orientalists (1911 Simla, India)
	Conference Seminar of International Tamil Studies (5th 1982 Madurai India)
Paris Peace Conference (1919)	Peace Conference (1919 Paris, France)
The last example illustrates the application of the Canon of Prepotence	The last example illustrates the application of the principle of individualisation. If the location is part of the name of the conference the location is not repeated and the rendering would be Paris Peace Conference (1919)

Conference without specific name. The name of a conference without a specific name and not held periodically is to be made of the name of the class of persons meeting together as conference, such as Citizens, Indian Residents, Ladies, Merchants, Musicians, etc. The name of the place of meeting is to be added as individualising element to the name of a conference rendered. This provision appears to be an attempt to assist in the assignment of a class number. If two or more names rendered are the same, the year or the year along with the month or date of the conference is to be added as a second individualising element. In AA2 named conferences are entered under their names and unnamed ones under titles. The concept is used in AA2 to individualise personal names, series, serials, and uniform titles as well:

Crawford, John C., 1900 Jan. 19-

Crawford, John C., 1900 Mar. 2-

Title. In rendering the title, the initial article and honorifics are to be omitted and the remaining words are to be written in the sequence in which they occur in the title-page.

AA2: Initial articles and honorifics are retained, but articles are ignored in filing.

In rendering the title, puff, if any, at the middle or at the end of the title, is to be omitted and is to be replaced by three dots if in the middle and by "etc.", if in the end.

AA2 1.0C: Indicate the omission of part of an element by the mark of omission "..."; precede and follow the mark of omission by a space. Words supplied by the catalogue: If the title-page of a book does not mention the title or if any addition is to be made to make the title intelligible, the title or the words to be so added are to be supplied by the cataloguer and enclosed in square brackets. AA2 1.0C: Indicate an interpolation by enclosing it in square brackets.

Individualising element. If two or more book index entries have the same title as heading and if the homonym is not resolved by the second section, the individualising element for resolving the homonym is to be in the sequence of preference, the author, if the name of the author is known; year of its first publication, if the year is known; name of the version; class to which it belongs, the class being of sufficient degree of intension to resolve the homonym, if author or year of publication are not applicable. This concept is employed in AA2 in

making additions to anonymous works entered under uniform titles:

CCC	AA2 25.5B
Genesis (Anglo Saxon poem)	Genesis (Anglo Saxon poem)
Genesis (Middle High German poem)	Genesis (Middle High German poem)
Genesis (Old Saxon poem)	Genesis (Old Saxon poem)

Alternative titles. If the title page contains two or more alternative titles, they are all to be given in the title portion of the main entry, connected by the word "or" by the symbol "or" or in any other suitable manner. AA2: Alternative title is part of the title proper: follow the first part of the title and the word or (or equivalent) with commas and capitalize the first word of the alternative title and prefer an added entry.

Series. If the name of a series occurs in variant forms in several pages of a book or in several books of the series, that which gives the maximum information in the shortest form is to be used as the uniformised name for rendering. If the name of the series does not occur anywhere in a book but occurs in some other book of the series, it is to be taken from that book. If the name of the series is not individualising—English series, Publication series, Translation series—its name is to be preceded by the name of an individualising entity with which it is associated—such as publisher, sponsor, university—followed by a comma. The name of the entity should be in catalogue entry form. If the entity used for individualising a series is the author of the book, the name of the individualising entity is to be replaced by the term "Its" "His" or "Her". Rule Interpretation on AA2 25.5B: Serials, including series: Create a uniform title made up of title proper plus a parenthetical qualifier for any serial entered under title if the title proper is identical to the title proper of another serial in the catalogue. The terms most commonly used to qualify the title proper are: place, corporate body, place and date or corporate body and date, date and edition statement, other title information, etc.

CCC	AA2
Patna University, readership lectures	Readership lectures (Patna University)
Tamil Nadu, Agriculture (Department of —) bulletin	Bulletin (Tamil Nadu (India). Dept. of Agriculture)
Gifford lectures (University of	Gifford lectures (University of

Edinburgh)
Gifford lectures (University of St.
Andrews)

Edinburgh)
Gifford lectures (University of St.
Andrews)

Major and minor series. If the name of a series consists of two distinct parts, those denoting a major series and a minor series respectively and if the name of the minor series is not sufficient to individualise it, the rendering is to consist successively of the name of the major series, a comma, and the name of the minor series. AA2's [definition of subseries: A series within series; a series which always appears in conjunction with another, usually more comprehensive, series of which it forms a section. Its title may or may not be dependent on the title of the main series.

CCC
Music for today, Series 2

AA2
Music for today. Series 2

Pseudo series: Conceptually this parallels series-like phrase in AA2. This is not treated as a series but given as a quoted note.

4 CONCEPTS

41 *Classic*

If a work, say a classic, a sacred work, a literary work, or a commentary on any of these is a quasi-class and has a proper name of its own. This invites a comparison with AA2's rule on uniform title: Use a uniform title for an entry for a particular item if the item bears a title proper that differs from the uniform title and the addition of another element, the name of the language of the item etc. is required to organize the files.

42 *Isolates*

Isolates and their subdivisions, chronological device, geographical device, subject device and alphabetical device, to name a few, anthology, biography, bibliography, history, periodical, report, 19th century, Asia, India, etc. have their resonance in the form subdivisions or freefloating form subdivisions and subdivisions controlled by pattern headings.

43 *Types of references*

Alternative name entry, variant-form-of-word entry, pseudo-

nym real-name entry have their parallels in see and see also references, name-title references, explanatory references for names of persons, corporate bodies, geographic names, and uniform titles in chapter 25 or AA2. While discussing the variant-form-of-word-entry, Dr Ranganathan offers two options: One way of saving the time of the reader and ensuring that he does not miss any of the relevant entries is to give a sufficient number of cross reference index entries, using the variants as headings, all the while making the heading of the main entry and the relative book index entry conform to the Canon of Ascertainability. This option is followed in AA2.

Another way is to use a uniformised form of the term for all the main entries and book index entries and refer from every variant form to the preferred uniform form. This option is followed by the Indian National Bibliography.

Pseudonym-real-name entry: If the pseudonym appears first in the heading in the main entry, the referred from heading in the pseudonym-real name entry is to be the real name. If the real name appears first in the heading in the main entry, the heading in the pseudonym-real-name entry is to be the pseudonym. The published version of AA2 indicated a preference for the real name if the author used his real name in some items and only one pseudonym in other items. Recently the rule was revised and now AA2 establishes full accord with CCC in this context.

44 Multiple Title-pages/Polyglot Title-pages

If there are two or more title-pages, the one to be chosen is to be the earliest of: (1) that which is special to the document catalogued, i.e. which is distinct from the generic title-page common to several documents; (2) that which is in the language of the dominant or distinctive work; (3) that which is in the language of the author of the work; (4) that which is in the favoured language of the library; and (5) that which is in the language occurring earliest in the scale of languages of the library.

AA2 1.0H: Prefer a chief source of information bearing a later date of publication, distribution, etc.; if the chief sources present the item in different aspects (e.g. as an individual item and as a part of a multipart item), prefer the one that corresponds to the aspect in which the item is to be treated; the source in the language or script of the written, spoken, or sung words if there is only one such language or script or only one

predominant language or script; the source in the original language or script of the work if the words are in more than one language or script; the source in the language or script that occurs first in the following list: English, French, German, Spanish, Latin, any other language using the Roman alphabet, Greek, Russian, any other language using the Cyrillic alphabet, Hebrew, any other language using the Hebrew alphabet, any other language.

45 Book Index Entry

Derived from heading. Permutation of the names in the heading, if it is one of two joint authors or two collaborators of the same kind; and in the case of joint organ or conference of two bodies, permutation of the names of the corporate bodies in the main heading; and in the case of a personal author and a corporate author, permutation of the personal author and of the corporate author.

Derived from titles section. Name of each collaborator mentioned in the title portion in case there is only collaborator of that kind; permutation of the names of joint collaborators of any kind mentioned in the title portion, in case there are only two joint collaborators of that kind; name of the first collaborator of any kind mentioned in the title portion, followed by the word "etc.", in case there are three or more collaborators of that; name of the sponsor in the case of a bill or set. -

Derived from note section. Name of the series occurring in each independent series note; name of each of the series occurring in an interdependent series note; the heading of the work mentioned in the extract note; heading, for each of the alternative titles of the book.

This would invite a comparison with 21.30B: Collaborators: If the main entry is under the heading for one of two or three collaborating persons or bodies, make added entries under the headings for the others. If the main entry is under the heading for a corporate body or under a title, make added entries under the headings for one, two, or three collaborating persons or under the first heading for the first named of four or more. 21.30C: Writers: Make an added entry under the heading for a prominently named writer of a work if the main entry is under the heading for another person or a corporate body or under title. 21.30D: Editors add compilers: Make an added entry under the heading for a prominently named editor or

compiler of a monographic work. Make an added entry under the heading for an editor of a serial only in the rare instance when a serial is likely to be known by the editor's name. 21.30E: Corporate bodies: Make an added entry under the heading for a prominently named corporate body, unless it functions solely as distributor or manufacturer. Make an added entry under a prominently named publisher if the responsibility for the work extends beyond that of merely publishing it. In case of doubt, make an added entry. 21.30F: Other related persons or bodies: Make an added entry under the heading for a person or corporate body if the heading provides an important access point: the addressee of a collection of letters, a person honoured by a festschrift, a museum in which an exhibition is held. 21.30G: Related works: Make an added entry under the heading for a work to which the work being catalogued is closely related. 21.30H: Other relationships: Make an added entry under the heading for any other name that would provide an important access point unless the relationship is purely that of a subject name of a collection from which reproductions of art works have been taken or a collection of books upon which a bibliography is based. 21.30I: Titles: Make an added entry under the title proper of every work entered under a personal heading, a corporate heading, or a uniform title. Make an added entry also for any other title, cover title, caption title, running title, etc. if it is significantly different from the title proper. 21.30K1-K2, L and M deal with making added entries for translators, illustrators, and series, analytical, name/title, for constituent parts of a title, without collective title, with collective title, if they do not exceed three; to the edition, if the chief source of information presents it as a commentary; to the commentary if the chief source of information presents it as an edition; and for texts with biographical/critical material.

46 Multi-volumed Book

The following example would illustrate CCC's treatment:

Hoffmann (M K) (1878), Ed.

Dictionary of the inorganic compounds

3V in 4.

V 1. Part 1. Introd. etc and water to silver, N 1-31

Part 2. Mercury to boron, N 32-55.

V 2. Aluminium to xenon N 56-58. Bibliographies.

V 3. Calculation table, index, etc. (This volume has A Thiel as additional editor).

AA2's treatment of this title:

Dictionary of the inorganic compounds/edited by M.K. Hoffmann. 3 v. in 4.

Includes bibliographies and index.

Contents: v. 1, pt. 1. Water to silver—pt. 2. Mercury to boron—v. 2. Aluminium to xenon—v. 3. Calculation table/edited by M.K. Hoffmann and A. Thiel.

If two physical volumes have the same title, the rendering would be: Contents: v. 1-2. Water to xenon.

If one bibliographical volume has been issued in two physical volumes, the rendering would be: Contents: v. 1. Water to boron (2 pts.)

Any difference in the edition statement among the volumes can be brought out by enclosing them in parentheses immediately after the specific title of the constituent volume.

47 Union Catalogue

Dr Ranganathan, a staunch exponent of classified catalogues, advocates arranging entries for union catalogues by author and title, as they are essentially location lists. The library of Congress has been publishing the National Union Catalog since January 1, 1956, author and subject; since 1975 Name headings and Monographic series in inkprint edition; and since 1977 this is printed in computer output microform (COM) in a register/index format. This consists of 4 parts: NUC Books, NUC US Books, NUC AV and NUC Cartographic Materials. Each of these parts appears as a register with indexes, name index (author, corporate name, etc.), title index, subject index, and series index.

48 National Bibliography

In a polyglot country like India, the national bibliography will have to be a composite one, an assemblage of the different linguistic bibliographies. The Indian National Bibliography should consist of fascicules corresponding to each of the language in which books are produced in the country. It might be of interest to notice that the Accessions list, India published by the U.S. Library of Congress Office—India was an assemblage of linguistic fascicules until September 1978.

49 Centralised Cataloguing and Printing of Cards/Pre-natal Cataloguing

Dr. Ranganathan has vigorously espoused these causes to conserve and utilise better scarce human resources and on purely economic grounds, a saving of 79 per cent of cataloguing and classification costs. British National Bibliography has been doing this. The Library of Congress has been performing this since 1901 and since 1971 has been doing pre-natal cataloguing (Cataloging in Publication) including the assignment of card number.

410 Chain Indexing and MARC Search Key

The concept of chain indexing, one other great contribution of Dr Ranganathan, is the basis of constructing a search key, called word list, wherein words are strung together as in chain indexing, to access the MARC data base.

411 Dimensions of the Catalogued Document

If the paper size follows international standard and conforms to the principle of aspect ratio, the height will be square root 2 times the width. In such a case, the height alone will be sufficient to indicate the format. This is followed in AA2, unless the width is less than half the height or greater than the height.

412 Tracings

Commenting on the LC's practice of giving tracings for added entries, subject entries, and series, Dr Ranganathan suggested an investigation into the economics of this practice in the Indian context. Almost all the libraries in the US are availing of this practice.

413 Kinds of Documents for Consideration

While discussing the documents in non-conventional scripts, braille, stenograph, music in notation, and cipher, documents similar to conventional book in physical appearance, reprographs like microfilm, microfiche and microcard, reprophonographs, cinema reels, and metadocuments or instrument-record-of phenomena, Dr Ranganathan has mentioned that new materials will require specially framed rules and made an appeal to the library profession to communicate its experiences, to collate and arrive at a set of cataloguing rules to describe these materials adequately and accurately. This plea should have worked on

the minds of cataloguing specialists spread all over the world who have willingly shared their experiences and thoughts resulting in the formulation of AA2. The layout of the contents page of part 1 of AA2

- Chapter 1 General rules for description
 - 2 Books, pamphlets, and printed sheets
 - 3: Cartographic materials
 - 4: Manuscripts including manuscript collections
 - 5: Music
 - 6: Sound recordings
 - 7: Motion pictures and video recordings
 - 8: Graphic materials
 - 9 Machine readable data files
 - 10: Three dimensional artefacts and realia
 - 11. Microforms
 - 12: Serials
 - 13: Analysis

The basic rules for the description of all library materials are in chapter 1, which sets out all the rules of general applicability. Then follow the rules for specific types of materials. Within the chapters, the rule numbering has a mnemonic structure one other innovative idea of Dr Ranganathan.

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4.6 Classified Catalogue Code in the Court of Context

M.S. SIDHU and K. NAVALANI

Classified Cataloguing Code is unique in many respects so much so that it is the first comprehensive code of rules for the classified catalogue. Publication of ISBD's by IFLA and its adoption by atleast a dozen codes, is a measure of their universal applicability. MARC II is also now on a permanent footing and many countries are joining the MARC club. But the Classified Catalogue Code remains where it was. Of all its cannons, the most appropriate for the formulation of a classified code is the cannon of context. It is a known fact that document production is no more book and periodical centred and many new media are now in practise. This change enjoins upon the codes to incorporate rules for cataloguing of such media. AACR has adopted itself to the change but the CCC is silent about it. The neglect of the basic cannon of the code is resulting in crippling consequences. The author opines that the country must join the MARC elite group and for this there are no option but to opt for AACR²

1 INTERNATIONAL SEMINAR ON RANGANATHAN

About two years after the death of Dr S R. Ranganathan present President of the ILA wrote an evaluative essay on him under the title "Ranganathan the Man."¹ The essay was also later included in the well-known serial anthology *Library Literature, the Best of*. An indication of the impulse for writing it was given by the author in its introductory part thus:

Great men are of heroic proportions. S R. Ranganathan was also built in the heroic mould. Instead of talking of him as the doyen of librarians, let us view him as a human being with qualities of head and heart. It is time that an assessment is made of him now that he had passed in history.²

Probably it is the same impulse which has prompted the Indian Library Association and its President to organise this Inter-

national Seminar. Both the Association and its President deserve to be congratulated for this.

2 RANGANATHAN'S UNIQUE POSITION

21 *Indian Library Movement*

Ranganathan is acclaimed as the father of Indian librarianship by the library profession of this country. His unique position in the profession in this country is recognised abroad also.

Berwick Sayers, considered him as the prototype of the profession in this country and bracketed him with Edward Edwards and James Duff Brown of Great Britain. Dewey of America, Graesel of Germany, de Lisle of France and Paul Otlet of Belgium.¹³ This assessment of Ranganathan is an underestimate. Neither Brown was the father of library movement in U.K. nor was Dewey in U.S.A. But Ranganathan is rightly called the father of Indian librarianship and occupies an unrivalled position in this country, not paralleled by anybody else in any other country. He has been justly called "One-man library movement"¹⁴ in this country by Shera. No other librarian in any other country can claim a position equal to that of Ranganathan in India which is the most exalted and unrivalled one.

22 *All-embracing Contributions to Literature of the Discipline*

Another uniqueness of Ranganathan is this there is no aspect of librarianship which escaped his attention. He wrote full-length substantial books in almost all areas of this subject.

To quote Garfield "Ranganathan is to Library Science what Einstein is to physics. Considering the many honours Ranganathan received, examination of his citation record only confirms the widespread subjective impression of his impact. We acknowledged Ranganathan's contributions several years ago when we included his portrait in the mural at ISI entitled "Cathedral of man."¹⁵

Jesse Shera, in his inimitable style assesses his contribution to the profession and says "This one cannot properly judge the work of S.R. Ranganathan without reference to the totality of librarianship is a tribute to the breadth and depth of his contribution to the profession"¹⁶. Bakewell points out that "There is scarcely an area of librarianship to which Ranganathan did not turn his attention: Library management, school and college

libraries, the broader aspects of libraries and education, book selection, reference service and bibliography.”⁷

3 CONTRIBUTIONS TO CLASSIFICATION AND CATALOGUING

However, it is in the twin (or shall we, echoing Ranganathan, say ‘symbiotic’) fields of Classification and Cataloguing that his work and contributions are better known. Eugene Garfield had succinctly underscored this idea when he declared that “Ranganathan’s works on Classification and Cataloguing are his best recognised contributions”⁸ In classification he is acclaimed universally. His *Colon Classification*⁹ and *Prolegomena to Library Classification*¹⁰ are recognised virtually as classics.

31 Cataloguing

Although his contributions in cataloguing are also not any the less significant, yet his work has not received due attention. Two out of his works in cataloguing stand out far above the others: *Classified Catalogue Code*¹¹ and *Headings and Canons*¹², the latter is rated by K.G.B. Bakewell “second only to Lubetzky’s *Cataloguing Rules and Principles* as the outstanding contribution to cataloguing thought in this country,”¹³ and J. Periam Danton lists it among the few solid comparative studies in librarianship.¹⁴

4 CLASSIFIED CATALOGUE CODE (CCC)

But his *magnum opus* in cataloguing is, at least according to majority of Indian librarians, his *Classified Catalogue Code* (CCC) with which this paper is primarily concerned.

41 Genesis

CCC is unique in many respects. It is a catalogue code which “owes itself to the sense of revolt induced in the mind [of the author] while learning cataloguing in 1924-25, in the School of Librarianship of the University College, London.”¹⁵

It required many years of gestation before it came to fruition. It is the only Catalogue Code which took birth in a railway compartment. It happened during a journey by its author from Madras to Calcutta and back.¹⁶ It is based on normative principles and every statement in it was put ‘on trial’

in the court room of class before his students.¹⁷ CCC (1934) is the first complete comprehensive code of rules for the classified catalogue.¹⁸

The first edition came out in 1934, *Theory of Library Catalogue*¹⁹ and comparative study of five existing codes published as *Headings and Canons* helped Dr Ranganathan in further understanding the problem, Canons of Cataloguing were enunciated. Symbiosis of classification and cataloguing gave birth to world-famous Chain Indexing. All these incorporated in its subsequent editions. A Hindi version of the third edition of the code with rules in *Sanskrit Sutras* was also published in 1952.²⁰

The work has seen 5 editions to date and 5th one (1964) is the last and current edition. Last year (1984) happened to be its golden jubilee year which went unnoticed.

42 Assessment

Sayers pronounces it to be by far the largest contribution to the subject.²¹ Bakewell terms it the first code specifically designed for classified catalogue.²²

5 CANONS

Dr Ranganathan has enunciated Canons of Cataloguing which are specific Normative Principles applicable to Cataloguing. According to him, drafting of a Catalogue Code, its interpretation, and guidance for cataloguing work should be based on them.²³

6 CANON OF CONTEXT

Of all the canons, most appropriate for the formulation and evaluation of a catalogue code is the Canon of Context, text of which is reproduced below:

“The Principle,

- 1 That the Rules of a Catalogue Code should be formulated in the context of:

- 11 The nature of the cataloguing features of the book, prevalent in the *mode* of book production;

- 12 The nature of the organisation of libraries prevalent in regard to the mode and quality of library service;

and

13 The coming into existence of published bibliographies and particularly bibliographical periodicals; and

2 That the rules should be amended from time to time to keep step with changes in the Context. . . ."²⁴

In other words, the 'Context' is supreme for this purpose.

7 EVOLUTION OF CATALOGUING IN THE LIGHT OF CONTEXT

71 *Manuscript Age and Incunabula Age*

While spelling out the Canon, Ranganathan points out that in the context of manuscripts each entry in a catalogue was . . . overweighted with details of physical bibliography" and was justifiably so because "the manuscripts were loosely assembled sheets, not firmly bound" and "each copy of a book was virtually unique". Under the circumstances "detailed description of size, collation, and even peculiarities of individual leaves as necessary in catalogue entry."²⁵ This state of affairs continued into the incunabula period also with justification that they are of immense help in historical bibliography.

72 *Book Age*

With the advancement and development of printing technology and its wide-spread use, the mode of book production saw a revolutionary change. Books became freely available and cheap. They were no more rarities or items of property for preservation. Change in context called for change in cataloguing practice and for change in the rules of catalogue code for use in modern service libraries.

73 *Classified Catalogue Code of Ranganathan*

Classified Catalogue Code of Ranganathan was in consonance with the new contexts of:

- (i) open access
- (ii) expectation of shorter life of book
- (iii) new demand in literature search warranted by increased research activity
- (iv) publication of subject bibliographies as an international project, and lastly

- (v) the publication of national documentation lists.

Nature and scope of the Code was influenced by all these contexts and its rules and directives were based upon them.

74 *Multi Media*

After World War II, the libraries as collections of books and other printed materials were moving towards a transformation, a process which was getting accelerated during the decades of fifties and sixties. In seventies, the transformation was quite perceptible.

In case of school libraries, the transformation was so complete as to warrant a change in the nomenclature. The school library has now come to be called a media centre or Learning Resources Centre (LRC) instead of school library. Harrod says it is a term which came to be used in late sixties in America.²⁶ Terms like media, 'multi-media' and 'media-centre' did not even appear in the glossaries and encyclopedias of our subject till seventies. Now these are firmly with us.

This change implies that the mode of book (or should we say 'document') production is not only printed material but it extends to non-print and non-book material requiring special handling e.g. audio-visual materials, microforms, computer software, etc.

75 *Paris Principles*

Marked change in context was brought in its train by the International Conference on Cataloguing Principles held in Paris, in October, 1961. This assembly of leading cataloguers from different countries of the world is one of the most, if not the most important turning-points in the history of cataloguing. Internationally agreed principles which emanated from this conference later came to be popularly known as Paris Principles. These Principles became the sheet of many codes.²⁷

76 *ISBD*

Leonare Coral suggests that the development of the International Standard Bibliographic Description formula grew out of discussions at the Paris International Conference in Cataloguing Principles, 1961 and International Meeting of Cataloguing Experts, 1969.²⁸

Publication of ISBD by IFLA is an epoch-making event in

the field of cataloguing. Sinkankas and Draily in 1974 hailed ISBD and recognised that the reach toward the goal of universal bibliographic control was immeasurably extended by it. They further noted that as at that time ISBD was the best format, subject to omission but not rearrangement, for all libraries and indeed for all institutions engaged in listing sources of information whether publishers or promoters.²⁹ That ISBD is fully adaptable to computerised cataloguing procedure is ensured through a means of tagging fields.

As of 1984, seven ISBD's were available in published form ISBD (M), First standard ed., rev. 1978; ISBD (S), First standard ed. 1977, ISBD (G), 1977; ISBD (CM), 1977; ISBD (NBM), 1977; ISBD (A), 1980; and ISBD (PM), 1980.³⁰

A distinctive feature of the ISBDs is that the descriptive information is taken from the item itself in the form in which it is presented there. According to Dorothy Anderson this feature "has been recognised as the most economical and more certain way of ensuring compatibility in bibliographic recording."³¹ Use of ISBDs has resulted in the lessening the importance of traditional differences in cataloguing practices and cataloguing codes related to choice and form of headings, names of authors, etc. It has also been recognised as basis for making library produced records compatible with those of organisations in the abstracting and indexing communities. Anderson is led to believe that the future development for the international exchange of bibliographic records can be envisaged as a system which is flexible, economical and catalogue code independent: that is records made in accordance with the ISBDs.³²

Adoption by and introduction into at least about a dozen national and multinational codes of these ISBDs is a measure of their universal applicability. Notable among such code are the *Anglo-American Cataloguing Rules* (AACR 2), 1978; The *German Cataloguing Rules* (RAK), 1977; and the *Nippon Cataloguing Rules*, 1977, ISBD texts are also available in translation in about a score of languages.

77 Computer in Cataloguing

Advent of computer in fifties and sixties was another factor to cause significant changes in the cataloguing scene.

Computer catalogue can provide access to any item in an entry, say to any word in it. This has eliminated the import-

ance attached to the main entry as also the entry word in catalogues.

78 MARC

The United States Library of Congress—defacto national library—and the national bibliographic agency of that country—was prompt to explore the feasibility of the use of computer in its bibliographic activities. King study was commissioned. Its report was published in 1963.³³ Consequence of this study was the well known LC MARC (Machine Readable Cataloguing) started as a pilot project in 1966 with the distribution of tapes to sixteen libraries.

With an improved format, the pilot project was continued on permanent footing under the name of MARC II, with more and more libraries subscribing to it. The United Kingdom did not lag behind and was next to join the MARC club under the name of UK MARC. More nations joined the tribe, subsequently.

781 Networks

The combination of computer and telecommunications technology allows significantly faster communication of information which transcends local, regional and international boundaries. ISBDs have been adopted by various national and multi-nationals codes to facilitate world-wide exchange of bibliographic data. They further act as catalysts for universal bibliographic control and its twin, universal availability of publications.

Cataloguing data is effectively being shared by many countries, thanks to MARC, OCLC, RLIN, etc. Such is the effect of their lead that international MARC has been included by IFLA in its new Medium Term Programme 1986-1991.³⁴

782 Standardisation

"If diverse bibliographic systems are to exchange records and conduct other business, standardization is required if chaos is to be avoided" rightly remarks Livingston.³⁵ Standardisation is a *sine qua non* for cooperative cataloguing and networking, for it leads to compatibility of bibliographic data and facilitates its exchange between bibliographic agencies. In this context, it is well to remember that LC MARC and UK MARC are like twins. Exchange of bibliographic data has been the hall-mark of these two systems from their being based on International

Standard Bibliographic Description (ISBD). A concrete result of this close cooperation and mutual exchange of data is available in the form of Books in English.³⁶

783 *International Cataloguing*

More and more countries have started their MARC service. Now a standard international format in the form of UNI MARC has come up which is speeding up the process of international bibliographic control and international liason and cooperation in the field of cataloguing. International cataloguing was so much to the fore and had become such a marked phenomenon that as early as 1974 it was the topic of an article in the *Encyclopaedia of Library and Information Science*.³⁷ A journal entitled *International Cataloguing*³⁸ is also being published.

784 *Research*

Ranganathan's Code is a product of *a priori* research. Its author revised the code in the light of comparative study of catalogue codes and observations and new problems encountered in cataloguing.³⁹ But no research was carried out to know enough about users' behaviour while in interface with the catalogue. This failure resulted in crippling consequences.

A case in point is title index entry. He observed that "Author heading and subject heading are the most popular among sought headings... Title heading is taken to be a sought-heading in some catalogue codes without any discrimination. But the Canon of Sought-Heading does not admit the claim of every kind of title... it is doubtful wisdom to give title entries to expressive titles."⁴⁰

Contrary to that, research studies have reported that "most people remember title better than authors."⁴¹⁻⁴³ Grathwol found that "where title entries exist, this approach is more efficient for locating a record than searching by author."⁴⁴

8 CCC IN THE COURT OF CONTEXT

From the above discussion, it is obvious that the context has witnessed a sea change. Dr Ranganathan aptly laid down that the rules of a catalogue code should be formulated in conformity of Canon of Cotent.

Mode of document production is no more book and periodi

cal-centred. Many other media are now very much with us. This change in the context enjoins upon the codes—both existing and the new ones—to take note of them (media) and incorporate rules for the cataloguing of non-book media. AACR is the best example of a code to adapt itself to the change. But the CCC is silent about them.

Nature of organisation of libraries and quality of service have witnessed marked departure from the past. A whole panorama of new demands on libraries has resulted in use of computer and advanced telecommunication technologies in library operations including cataloguing and these are being regarded panacea of all library problems. Accessibility of information is basic today. "Democracy of the intellect, based on widespread availability of knowledge and information, is essential to the success and continuity of man's ascent."⁴⁵

AACR2, being firmly based on ISBDs, is finding more favour and is increasingly being adopted as basis for cataloguing in libraries and national bibliographies and MARC. Harrod rightly remarks that "it is the most widely used of the multinational codes, being used in many countries."⁴⁶ It is vigilant about context and AACR2 covers all media also.

If India wants to catch up with the rest and join them as an equal partner—as we 'enter the twenty first century' to use the words of our four Prime Minister she must join the MARC elite group and for this we have no option but to opt for AACR2.

CCC has not only lagged behind in this race but has not seen any revision since 1964. The world has become static for it since then. All changes in context have been ignored by it. *It seems to have lost its relevance in the present era.* World has changed a lot. Nay, we have entered the "Third Wave."⁴⁷ One of the critics of CCC has gone to the extent of calling it "dodo" and believes that "an epitaph... is now overdue."⁴⁸

9 PROPHECY OF THE MASTER

We would like to conclude with his prophetic message in this connection:

"The world of books is not static. Context is ever changing..."

"The refrain of the Canon of Context in its application to library catalogue and to library catalogue code is: "Ever becoming, ever new."⁴⁹

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SECTION 5

MANAGEMENT OF LIBRARY/INFORMATION SYSTEM

5.1 The Role of National Statistical Databases in the Planning and Management of Library Services*

JOHN R. BROCKMAN

A tribute to Ranganathan's pioneering contribution to scientific management, particularly in relation to the analysis of data required for rational decision-making in libraries. Examines the current role and future prospects for national computer-based statistical collections in the United Kingdom, United States and Australia, and the potential for this approach in developing countries.

Notes the emergence of a greater concern for the availability of adequate statistical data to support the quantitative approach to resource allocation. UK, US and Australian evidence strongly suggests, however, that the development of machine-readable databases may be inhibited by lack of numeracy and computer literacy among many at the senior levels of the librarianship profession. This appears to be associated with a failure to recognise either the utility of "hard-edged" techniques for policy analysis, based on economics and operational research, or the importance of the strategic approach to planning and management.

Recommends remedial measures for these countries and a model for action in the developing nations.

*Opinions expressed in this paper are those of the author and not necessarily those of his employer or any other British government department.

1 INTRODUCTION

It is emphasised at the outset that this paper does not purport to be a comprehensive review of national databases of library statistics, nor is it exhaustive in its enumeration of currently-available systems. Rather, it is an account based on personal experience gained while developing one such system, the Australian ANZALDATA¹ file, during the course of which contact was established with fellow-workers in the United States and United Kingdom, together with a number of other individuals, both proponents and critics of this approach to library management. The paper is offered in the belief that such a case history can yield general lessons which may guide the successful development of new systems.

For those unfamiliar with the nature and content of library statistical files (Table 1) outlines the principal features of ANZALDATA and the four other systems encountered during its creation. In principle, these databases may be used to identify a range of economic relationships between library funding, staffing, bibliographical resources, levels of demand and user populations. They thereby provide a basis for informed discussion on quantitative aspects of library services, including the justification of budget, staffing and other input levels. More importantly, they aid the rigorous search for, and assessment of, facts about policy options, the latter being vital to the strategic approach to policy formulation and resource management.

There are however a technical, organisational and human factors which tend to diminish the extent to which the analytical potential of existing systems has been successfully exploited, and it is important that these should be recognised when designing and implementing new systems. These factors will be elaborated upon later, but before doing so it necessary to make some general observations on the origins and objectives of the systems outlined in the Table.

2 ORIGINS AND PURPOSES OF THE DATABASES

All the files were originally established to facilitate the computerised production of the corresponding published statistical series. In the case of both ARL and ANZALDATA, retrospective data for those years prior to the implementation of the compu-

TABLE 1. Major Databases of Library Statistics

Database & title of printed version	Library sector	Contents of records		No. of libraries	Year for which earliest data available
		Broad aspects covered (see key below)	Tot. no. of variables		
ANZALDATA (Australian & New Zealand Academic Libraries Data System) Library statistics supplement to <i>Australian Academic and Research Libraries</i>	Aus. & NZ univ & coll.	a, b, c, d, f, g.	86	77	1973
ARL (US Association of Research Libraries) <i>ARL Statistics</i>	US & Canadian univ.	a, b, c, d, e.	36	98	1962-63
CIPFA (Chartered Institute of Public Finance & Accountancy) <i>Public Library Statistics</i>	UK Public	a, b, c, d, h. (j from 1984-85)	85	164	1983-84
SCONUL (Standing Conference of National & University Libraries) <i>SCONUL expenditure statistics</i>	UK univ. †	a, d, f.	55	57	1980-81

UNESCO (Unesco Statistical Data
Bank)
UNESCO Statistical Yearbook

National, a,b,c,h,i 23 115 1971
public, Countries
univ.,
school &
special
in UNESCO
member
Countries

Notes:

a : staffing
b : services
c : bibliographical resources
d : expenditure

e : salary scales
f : enrolments
g : teaching staff
h : population

i : registered borrowers
j : policy background & measure
of demand

ter-based system have been added to the files to permit the identification of historical trends. Similar supplementation of the CIPFA system is currently under consideration. The contents of all the files are restricted to specific sectors of particular national library services, with the exception of UNESCO which is both international in scope and comprehensive in its coverage of the principal library sectors, although of course records represent national aggregates rather than the statistics for individual libraries. Finally, computer-readable versions of all files are available to outside bodies, apart from those of the SCONUL system, for which the data are confidential to contributing libraries.

The distribution of these statistics in printed form no doubt ensures the widest availability of the basic raw data, although, as such, its usefulness as a planning aid is limited to making crude visual inter-library comparisons, possibly assisted by tedious manual calculations. The production of graphical representations of the data would naturally be even more time-consuming. For these reasons at the end of the 1970's projects were initiated concurrently in the United States and Australian academic library sectors to make retrospective statistics, with annual updates, available on magnetic tapes. These were to be capable of analysis using one or other of the statistical packages with which most university and college mainframe computers were equipped. These developments were followed in the United Kingdom by the production of a computer-readable version of the CIPFA public library statistics, available in either tape or disc form for local use, or accessible by terminal on-line from the CIPFA central minicomputer in London. The latter machine is also accessed by on-line microcomputers and remote mainframe computers at bureaux and elsewhere.

In the British university sector a different approach was adopted. Rather than make the original raw data available in computer-readable form for analysis by users, the compilers of the SCONUL statistics identified a comprehensive range of key management ratios relating expenditure to user populations and these were published with various summary statistics for groups of university libraries. Finally, in the case of the UNESCO Statistical Data Bank the structure of the file limits the possibility for analysis using one of the standard statistical packages, the principal purpose of the Data Bank being to support computer-typesetting of the UNESCO Statistical Yearbook. Serious ana-

lysis would require the writing of special programs, and it is understood that no attempts have been made to do this.

We should now look at some of the actual and potential applications of these databases before examining the barriers which appear to inhibit their effective adoption. Generally these applications are of two main types, based on analysis at:

1. The sectoral level, in which data for all libraries of a particular type are aggregated nationally, or perhaps grouped according to geographical, administrative or other criteria.

2. The individual library level, the lowest level of aggregation. Applications falling into the first category tend to be of primary interest to those concerned with national issues, while the second group is likely to be of more relevance to the internal management of individual libraries. Of course it should not therefore be inferred that these two interest groups are mutually exclusive, for our concerns may vary according to the matter at hand. Also, it will be shown that the results of some types of sectoral-level analysis may be used to the benefit of individual libraries and, equally, library-level analyses may assist in the formulation of national policies.

3 SECTORAL-LEVEL ANALYSES

These may use a wide variety of approaches ranging from the calculation of simple summary statistics, such as averages, the range of values and their degree of concentration around particular points on the scale, to fairly sophisticated econometric-based techniques. The latter may be used to investigate matters such as the extent to which economies of scale are likely to exist within a group of libraries, on the basis of which it may be possible to judge whether a few large units are likely to be more expensive to operate than a large number of small units, for a given level of service. Econometric techniques may also be used to support investigations of library efficiency and productivity. Aggregated data provide a basis for the study of national collection growth rates and changes in the pattern of costs over time, thus enabling projections to be made. Several major forecasting investigations have been conducted in the United States in relation of collection sizes² and the impact of computerization on library costs,³ both based on ARL data.

Admittedly, it would be possible to perform some, but by no means all, of these analyses manually, given sufficient time.

However one of the many advantages of using a computer-based system is that one may omit, at will, those libraries which by virtue of their size exercise an undue influence on the results.

Another important approach to sectoral level investigation is through multiple regression analysis, one of the most widely-used statistical tools for policy analysis. In our case this technique permits the investigation of the association between library-related variables, and may be used to estimate, for example, the library costs (or component costs) associated with certain categories of user. The ANZALDATA file has been used thus to identify the various library-related costs associated with particular enrolment categories, such as the dichotomies of undergraduate, arts-based and science-based, and full-time and part-time.⁴ The North American ARL file has been used in a similar way.⁵

The CIPFA approach to analysis has been through the development of a central database comprising statistical series on a range of local government services, including those for public libraries. Apart from the traditional sectoral-level analyses involving the production of counts, rankings, averages and other summary statistics an interesting development has been the facility to produce very high quality multicoloured density maps of the results of analyses, defined on a variety of spatial areas, notably local authorities.

4 LIBRARY-LEVEL ANALYSES

Apart from those library-level analyses used to monitor, for specific libraries, year by year changes in various measures of their resources, services and expenditure, some of the most important analyses are those aimed at making inter-library comparisons.

Throughout the public sector the comparative approach is being increasingly regarded as an evaluative tool, and as a substitute for the competitive element to which private sector efficiency is largely attributed. Similarly, inter-library comparison has become accepted as an important technique for library planning and management. In fact in the United States, the Association of Research Libraries (ARL) and Association of College and Research Libraries (ACRL) have formally abandoned the use of formulae-based standards for determining

staffing and resource levels in favour of the inter-library comparison approach.⁶ It was considered that formulae did not reflect the prevailing situation; staff requirements were generally overpredicted by the formulae, while the number of periodicals was consistently underpredicted. Formulae were largely supported by the librarians of the smaller institutions, but those in the larger, wealthier institutions were opposed to standards, believing that these were based on minimum levels far below what they were able to achieve. It was considered that the use of quantitative standards led to invalid comparisons when comparing libraries at the extreme ends of the spectrum, and this objection led to the adoption of commonly-accepted techniques rather than less widely accepted quantitative standards. Consequently the ARL and ACRL statements on standards offered no quantities. Instead, they recommended that those who were required to make judgements about university libraries should do so on the basis of techniques such as the analysis of ratios and multiple regression analysis.

The former is fairly self-explanatory and involves calculating for each library in a group of comparable libraries various management ratios by which their performance can be compared. Examples of these key ratios might be loans per student, expenditure per student, acquisitions per technical services staff member and students per readers services staff member.

Multiple regression analysis, in this context, is rather more complex. In essence, however, for any particular resource or other aspect under investigation, it first involves the identification of one or more factors likely to account for inter-library variations in this resource. For example, inter-library variations in the total number of readers' services staff in an academic library is likely to be associated with variations in the number of students and staff, loans, volumes in the collection, seats in the reading room and total number of opening hours. Using a multiple regression package the analyst may investigate the simultaneous effect of these latter explanatory factors and, for each library, measure the extent to which its readers' services are theoretically understaffed or overstaffed. Figure 1 shows a small part of ANZALDATA output from such an investigation, while Figure 2 illustrates, for the same libraries, the results of an analysis in which technical services staff numbers were similarly predicted on the basis of the number of monographs, the number of monographs added annually and the number of

current serial titles in each library's collection. These two analyses were originally performed by the author to assist a chief librarian involved in an argument relating to his staffing levels. The results of similar North American ARL analyses have, however, been openly published, and Figure 3 reproduces a small segment of one such study.⁷

Having looked at some of the technical and methodological aspects of library statistical databases we should now examine the kinds of problems likely to be encountered in educating library policy-makers and managers in their use.

5 PERCEPTIONS OF THE ROLE OF DATABASES

Not surprisingly, opinions and attitudes seem to be very diverse, depending on training and background—and possibly on previous experience in using conventionally published library statistics. Some Australian and New Zealand academic librarians' written responses to a circular letter announcing the availability of ANZALDATA file reflect an astonishingly low level of sophistication in their use of quantitative method in the management of their libraries:

It will have to continue to do my calculations by mental arithmetic and my comparisons by human visual means.

[Librarian of Major Australian College]

So far, I have been able to get all the management information I need by simple manual calculations. . . Maybe my successor will be bad at sums and will have different views.

[New Zealand University Librarian]

I do not see what valid and useful analyses I might perform on the data which I cannot do, as easily and as quickly and far more cheaply, with the aid of a pen and calculator. Indeed, I do this all the time.

[Australian University Librarian]

A few others had misgivings about using ANZALDATA because they considered some of the underlying statistics to be suspect, although it should be pointed out that computer-based systems provide the possibility of going some way towards automatically detecting dubious data and ignoring them during analysis; much of the ANZALDATA file had in fact been cleaned, as far as suspect statistics were concerned, during its compilation. The overall response from potential users was very positive and eleven institutions and consortia of institutions indicated an interest in purchasing ANZALDATA. Many other Australian librarians

Fig 1

PREDICTION OF LIBRARY STAFF REQUIREMENTS

21-Aug-80

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READER SERVICES

File DRFTV2 (Creation date = 21-Aug-80) AUSTRALIAN & NEW ZEALAND ACADEMIC LIBRARIES STATICS

Subfile A B C D * * * * * MULTIPLE REGRESSION * * * * *

Dependent variable READSERV from Variable list 1
regression list 1

SEQNUM	Observed READSERV	Predicted READSERV	Residual	-2 0	Plot of standardized residual
1	32 0	32 4	-0 47		
2	28 0	24 4	3 5		
3	32 3	30 7	1 5		
4	32 0	25 2	6 7		
5	26 0	26 4	-0 98		
6	69 0	65 7	5 2		
7	35 0	32 2	2 7		
8	48 0	46 4	1 5		

Fig. 2

Plot of standardized residual

Residual

Predicted
ACQCALObserved
ACQCAL

SEQNUM	Observed ACQCAL	Predicted ACQCAL	Residual	-2 0	Plot of standardized residual
1	26 0	28 1	-2 1		
2	20 0	20 5	-0 57		
3	21 7	19 9	1 7		
4	15 7	18 0	-2 3		
5	17 0	15 5	1 4		
6	33 2	32 0	1 1		
7	17 5	18 0	-0 53		
8	40 0	34 0	5 9		

Fig 3 TABLE 5 TOTAL EXPENDITURES BASED ON VOLUMES HELD AND VOLUMES ADDED (GROSS) — ALL ARL ACADEMIC LIBRARIES

STEP	Variable	Removed	F 10	Significance	Multiple R	R Square	R Square Change	Sample R	Overall F	Significance
Entered			Enter or Remove							
1	VOLS		216 06449	000	85141	72489	72489	85141	216 06449	000
2	VOLSADG		22 91896	000	88632	78557	06067	82011	148 36922	000
				*****	*****					
Observation	Y Value	Y Estimate	Residual	-750				0 0		+250
1	Alabama	2022444	2907695	-885251 4						
2	Alberta	7012435	4698773	2313662						
3	Anzonia	3908615	53792 0	-1470655						
4	Anzonia State	3089746	3762306	-672559 6						
5	Boston	3312551	3117040	195511 3						
6	Brighton Young	DELETE DIIF TO MISSING DATA								
7	British Columbia	861686	5805980	810887						
8	Brown	2407427	3026811	-10784 1						

Notes on Figures 1, 2 and 3

These three figures contain small extracts from the results of multiple regression analyses of library data using the Statistical Package for the Social Sciences (SPSS). The output in Figures 1 and 2 was produced using the ANZALDATA system at the Western Australian Institute of Technology, while Figure 3 contains an extract from ARL output from the University of Virginia; hence the differing appearance.

Essentially, however, each extract contains five columns representing from left to right: an identification of the library, number 1-3 in the case of ANZALDATA and number 1 in the ARL output; the observed value of the dependent variable, its predicted value, the difference between these two (termed the residual), and finally a plot of standardized residuals indicating, for each library, whether the predicted values are greater or less than the observed values.

In Figure 1 the total number of readers' services staff was predicted from the number of students attending self loans, volumes in the collection, seats in the reading rooms and total number of opening hours for a week. Libraries which are theoretically overstaffed plot on the right, and understaffed on the left of the zero line.

In Figure 2, for the same libraries, the total number of technical services staff was predicted from the total number of monographs, the number of monographs added annually, and the number of personnel in the collection.

In Figure 3 total library expenditure was predicted from the number of volumes held and the number of volumes added annually. Libraries which are theoretically overfunded plot on the right, and underfunded on the left of the zero line.

clearly recognised not only the need for inter-library comparative information but also guidance on how it could be used most effectively in library management.⁸ This Australian experience of the introduction of computerised library statistical systems is in contrast with that of the United States group working on the same kind of endeavour. A member of the Task Force on ARL Statistics reported an almost negligible interest on the part of North American academic librarians in purchasing ARL computer tapes, although they were quite willing to buy printed versions of the raw statistics which these tapes contained.⁹ This attitude was later evident among British public librarians when the CIPFA library database became available for, as mentioned above, none was sufficiently interested, even a year after its release, to use the machine-readable version of the statistics.

While librarians in general were not overly enthusiastic about acquiring copies of the actual computer tapes there was evidence, in both the United States and Australia, of a demand for analyses. In the case of the former this need remained unsatisfied, for reasons explained by Kendon Stubbs of the University of Virginia Library, the center responsible for maintaining the ARL system:

There is .. considerable interest in this country in special analyses of the data designed to meet the needs of individual libraries. We could probably do a thriving business in answering questions from particular libraries; but we have been reluctant, merely because of lack of time and personnel, to get into this business.¹⁰

ANZALDATA analyses have been undertaken at the library of the Western Australian Institute of Technology, generally to assist academic librarians requiring support for budget submissions, or for those involved in arguments over staffing levels. Some of the other policy issues investigated related to the library-related implications of college amalgamations.

Finally, an attempt will be made to identify the principal factors appearing to underly the pattern of development of the systems discussed in this paper, especially those factors associated with librarians' attitude to their use.

There seem to be two significant features in the evolution of these databases, the first of which relates to the procedure by

which the statistics have been collected and made available. This tends to emphasise the need for statisticians to understand the processes described by these data, and the purposes for which the published statistics can be applied. It might be argued that in an ideal world collection and production would be undertaken by statisticians and computer specialists having a dual qualification which included librarianship, while libraries would be managed by librarians whose professional studies incorporated one of the numerous disciplines, such as economics, computing, accounting or statistics. Even if this situation was attainable it would obviously not necessarily be in the best interests of these library services. Nevertheless, this does not deny the importance of establishing good channels of communication between the publishers and users of library statistics, not only to ensure that the information collected is appropriate to library management needs but also to help librarians to make the most effective use of the available data. With the advent of computer-based systems it is particularly important to ensure that files created to facilitate the production of printed statistical reports are designed to permit subsequent analysis. This has not always been the case. One possible approach to overcoming the above difficulties also takes into account the second problematic area, and so this will be discussed at the end of this paper.

The second feature evident from the foregoing account relates to a general failure on the part of librarians to recognise the importance of analytical and evaluative techniques in policy analysis, especially those so-called 'hard-edged' techniques derived from economics and operational research. In many branches of management, particularly those which have evolved in the British tradition and which have therefore frequently been dominated by generalists, policy analysis tends to have the classical connotation of 'thinking through'. In the public sectors of many countries however, at both central and local government levels, policy-making has become increasingly less programme (or output) oriented and the emphasis has shifted towards resource (or input) management. While most public sector outputs are notoriously difficult to measure, inputs in terms of costs and resources are more amenable to quantification. Consequently, the techniques appropriate to policy analysis today tend to be oriented towards evaluation and performance measurement, are frequently based on hard-edged quantitative techniques and are often highly sophisticated. Unfortuna-

tely most generalist managers are inadequately equipped with those technical skills required for efficient management, a comment probably no less true of librarians than of other managers—on both sides of the Atlantic and elsewhere.

Librarians however face additional problems. Quite apart from those arising from restrictions on their expenditure and the need for greater management controls, the impact of new technologies with their wide-ranging effects call for longer time horizons in library planning. Library-related policy decisions are therefore becoming less involved with routine and more concerned with strategy, with the inherent implication that these decisions demand analytical support far beyond the scope of 'thinking through'. T. Cannon, Professor of Business Studies at the University of Stirling in Scotland, remarks of libraries.

The reluctance to embark on strategic planning reflects both lack of training in this field and a tradition of dependence on external policy formulation.¹¹

Replies of a questionnaire survey conducted by the present author among the heads of British university, polytechnic and college libraries appear to reflect this failure to think strategically.¹² Asked to identify their long-term management problems, typical of many of the responses were:

Aging of staff in a stagnant structure with little recruitment, with the resulting lack of new ideas and diminishing inclination and ability to deal with innovation.

Staff mobility, or lack of it, and the consequences upon retraining for new technologies and improving flexibility of staff to respond to change.

... the need to become something which one's temperament, experience and professional skills may not suit one for, or incline one towards.

Problems are not seen as stimuli to action and an opportunity for positive change, and the future is viewed by some with considerable foreboding and a certain resignation. This attitude may be very deep-seated in its origin. Morrison¹³ suggests that the ideological stance of librarianship as a stabilizing force and its concomitant conservative professional outlook could inhibit the use of techniques intended to forecast, endorse and, some

times, create change.

Many of the factors identified above have implications for librarianship education, but clearly this solution would involve a very long time scale. Moreover, it would not remove the necessity for specialised advice to assist the managers of individual libraries and policy-makers at the sectoral level. One possibility, advocated for the United Kingdom by MacDougall,¹¹ is the establishment of a national data analysis centre with responsibility for collection, analysis and publication of statistics for all library sectors. Such an approach would probably be equally appropriate elsewhere in the world but would, as the author points out, require tangible support from central bodies backed by persuasive or statutory powers. MacDougall considers that interpretation should remain the responsibility of the particular library or groups of libraries. While this may be a reasonable contention in principle, it is in this very area of statistical interpretation and application that librarians' weaknesses lie, as this paper attempts to demonstrate. For this reason it is vital that clients of such a centre should have access to specialist advice from a competent policy analyst. The latter (and statistical database designers) have an important role to play, for a more complete and accurate knowledge of the relevant parameters can lead to more effective and more rational policies. The reduction of the areas of ignorance and contention will enable those responsible for policy-making to concentrate upon the more important subjective aspects of planning for library services.

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5.2 Ranganathan's Seminal Mnemonics Approach (SMA) Its Implications—Now and Everafter

P PRATAP LINGAM

This paper (a) highlights far reaching advantages and implications of Seminal Mnemonics Approach (SMA) and its everlasting value (b) Discusses how SMA is useful in all facets of information management, provides basic skills in controlling the generation of ideas by reducing the 'volume and 'complexity of flood of inf, interpreting and facilitating the regeneration of inf/knowledge, assists in innovative and creative work, compatible with and complement to modern technological changes/applications (c) Substantiates by case studies using SMA in versatile applications such as communication, systems analysis and problem solving; inf analysis and consolidation work, analysis structuring and preparing corporate/business plans and technology transfer agreements, industrial coding systems As a result SMA acquires uniqueness as a tool for *decisive action* (d) Consequently, SMA provides an avalanche of opportunities to professionals in any field for improving their performance Hence there is a need to exploit and realise the everlasting implications and applications of unique contribution of Ranganathan

1 INTRODUCTION

Dr Ranganathan has recommended the use of Seminal Mnemonics in the design and development of schemes for classification in his General Theory of Classification. Later, some studies were made on the use of Seminal Mnemonics in Colon Classification.¹ The role of classification in various information activities, especially its input value in filtering of relevant knowledge, as an aid in learning and as a synergiser to information activities were also studied.² The value and benefits of these roles and the effectiveness of classification—which is a "*lingua franca* for knowledge—processing and use"—are greatly enhanced by the use of Seminal Mnemonics. Thus, the concept of seminal mnemonics, it appears, is more familiar to

classifiers and classificationists than to many of the library and information specialists. But its use and benefits are not restricted to classification alone.

What is not generally known to some inside and many outside the profession about Seminal Mnemonics Approach (SMA) is its:

- 1 Multifaceted advantages of far-reaching consequences;
- 2 Versatile applications in different fields, in addition to information technology, including: presentation of ideas in documents and lectures; Systems Analysis and Problem solving; Communication; preparing Corporate/Business Plans, Technology Transfer Agreement, Project Implementation; Industrial Coding Systems etc.
- 3 Ability in assisting and accelerating innovative and creative work;
- 4 Modernity; and
- 5 Everlasting value and uniqueness.

Scope of the paper. An attempt is made in this paper to highlight and emphasise the above mentioned less known aspects of SMA, based on experience gained in applying it, so that the *unique contribution* of Ranganathan is duly recognised, exploited and widely adopted beyond the library and information field.

2 WHAT IS SEMINAL MNEMONICS APPROACH (SMA)

Whenever we try to understand the subject matter of any document or a situation or a problem, we try to identify various ideas occurring in the context and group them, classify them, so that their nature of relationship is revealed, based on which a pattern of understanding emerges. In this context, if we have some common framework and seminal approach which will enable us to analyse and probe deeper into the subject/problem resolving various conflicts at verbal and idea planes, then it would save our struggle for reducing confusion and complexity and clear our thinking/learning process. The Seminal Mnemonic Approach (SMA) is one such powerful and useful framework. This intellectual analytical tool was distilled out of enormous experience and proven applications, and explicitly expressed by Ranganathan.

21 Definition

The use of Seminal Mnemonics consists of having the same digit or digit-group to denote seminally equivalent ideas in whatever subject they may occur, even though different terms may be used to denote the ideas in different contexts. This will facilitate the identification of similarity of ideas recognisable at great depths beyond the reach of natural languages. As and when the idea is recognised at the phenomenal level in a particular context, a term in the natural language is used to denote it in that context.¹⁴

Thus, while there is equivalence in the idea plane, there may be differences in the verbal plane. This concept of equivalence at the near-seminal level in the idea plane has helped to develop a system of seminal mnemonics both in the idea plane and the notational plane.⁷

22 Rational Behind SMA

The following table gives a summary of the rationale behind the denotation of a particular group of ideas by a particular digit (numeral),

TABLE 1. The rationale behind denotation of a particular group of ideas by a particular digit.

Numeral	Mnemonic Idea denotgd in	
	Idea Plane	Practical Plane
1	Origin, Beginning	Principles, Fundamental law, Hypothesis, Statement of objectives, Policy statement, Problem.
2	Components and their inter-relation	Structure, Constitution. Form. Source of knowledge.
3	Function	Analysis, Detection, Establish equation model etc.
4	Deviation from norm problem	Synthesis, Pathology, Wastage, Failure, Error.
5	Environment, Ecology	Prevention, Protection, Environmental facts.
6	Genetics, Evolution Phylogeny, Methodology treatment	Built in mechanism, Treatment, Resolution.
7	Development, Integration	Integrated view, Whole personality.
8	Implementation, Ensuring, Continued functioning	Management, Organisation. Conclusion, Recommendation.

TABLE 2: Illustration of ideas denoting 'property' in different subject fields

<i>Mnemonic number</i>	<i>Mnemonic idea</i>	<i>Biological sciences</i>	<i>Linguistics</i>	<i>Religion</i>	<i>Psychology</i>	<i>History, Political science</i>	<i>Sociology</i>
1	Starting point	Non enclosure	Sound (Phoneme)	Mythology	Nervous reaction	Policy	Civilization
2	Structure	Morphology	Morphology	Scripture	Sensory stimulus	Constitution	Physical character
3	Source of information						
	Function	Physiology	Syntax	Theology	Consciousness	Function	Activity
4	Error	Disease	Meaning	Religious practice	Cognition	—	Social pathology
5	Ecology	Ecology	Thesaurus	Preaching	Emotion feeling	Relation with citizen	Demography
6	Built-in-mechanism	Genetics	—	Institutionalisation	Connotation movement	Source	Socialization
7	Personality, whole view	Development	Composition	Religious sect formation	Personal identity	—	Personality

TABLE 3: Illustration of ideas denoting 'Action' in different subject field.

<i>Mnemonic number</i>	<i>Mnemonic idea</i>	<i>Applied physical science</i>	<i>Applied biological science</i>	<i>Linguistics</i>	<i>Psychology</i>	<i>Education</i>	<i>Sociology</i>
1	Creation, Starting	Generation, Initiation	Research, Survey	Research, Survey	Research, Survey	Research, Survey	Research, Survey
2	Designing classification	Designing	Classification	Classification	Classification	Classification	Classification
3	Analysis, Diagnosis	Analysis	Diagnosis	Analysis	Analysis	Analysis	Design Analysis
4	Interlinking, Correlation, Synthesis	Synthesis, Transformation	Correlation, Interlinking	Correlation, Synthesis	Correlation, Synthesis	Correlation, Synthesis	Correlation, Synthesis
5	Prevention, Protection	Control	Prevention, Protection	Control	Control	Control	Prevention control
6	Correction, Treatment, Measurement	Measurement, Correction	Treatment, Correction	Correction	Measurement, Correction	Measurement, Correction	Correction, Treatment
7	Integration, Developing, Management	Assembly, Developing	Developing, Conservation	Developing, Conservation	Developing, Conservation	Developing, Conservation	Conservation, Developing
8	Manipulation	Management, Manipulation	Manipulation	Management, Manipulation	Management, Manipulation	Management, Manipulation	Management

23 *Helpful Sequence of Ideas*

Further, it is observed from the table above that the ideas denoted by each particular numeral are automatically arranged in a helpful sequence in the order of ordinal value of numerals, resulting in a pattern parallel to the mode of thinking/learning among normal intellectuals (See also Sec. 7.2)

24 *Illustration*

Since it is difficult to communicate about this concept of SMA, its practical use is not easily understood. Therefore, several case studies of practical applications are given in Sec. 4 and 5. However, before presenting the case studies, a bird's eye view of a general pattern for arrangement of ideas denoting 'property' and 'Action' in a wide variety of subject fields, using SMA is illustrated in Table 2 and 3 respectively. The concept of equivalence of ideas in the near-seminal level along with equivalent notation is noticed from these illustrations.

3 FAR REACHING ADVANTAGES OF SMA

The SMA helps to gain ease and clarify in the thinking/learning process owing to the following advantages:

- (i) help to identify and concentrate on core ideas;
- (ii) facilitate detection of missing links/defects and precautions to be taken;
- (iii) discover relationships among ideas;
- (iv) gives an insight, and intergrated overview of the situation;
- (v) arrive at a helpful sequence of ideas for exposition or for developing a thought content;
- (vi) aid memory and recall; and
- (vii) conserve time and mental energy in thinking/learning process.

4 VERSATILE APPLICATIONS

41 *Presentation of Ideas in Communication*

As mentioned earlier, SMA was used by Ranganathan long back not only in Colon Classification but also in the development of thought content in all his works, and in his research owing to its far reaching advantages.

For presenting and structuring the text of a document and in a 'technical writing' the pattern of Seminal Mnemonics has been recommended and the particular advantage of arriving at a helpful sequence in which ideas get arranged were discussed by Neelameghan^{5,7}. This in turn results in productivity in formulating the works. Also, the presentation of ideas in well known works (case studies) outside the library and information field, was shown to be in conformity with the sequence of the numerals in Seminal Mnemonics¹³ which lends support to the use of seminal mnemonics as mode of structuring and presenting the ideas in a lecture or a document. Thus it was established beyond doubt that the use of SMA in any communication has several valuable advantages.

42 Systems Analysis and Problem Solving

Systems Analysis is a powerful tool which the modern management professionals and consultants employ at different levels and areas of management for systematic thinking and problem solving. One great exciting and surprising advantage is that without being aware of and experience in Systems Analysis, one can achieve the same results of using systems analysis by applying SMA. This is because it has been revealed that the pattern of Seminal Mnemonics resembles the general steps used in System Analysis—that is the sequence of ideas obtained after using the SMA represents the sequence of steps in systematic thinking, scientific method, and in problem solving.⁸ Some of the additional applications of SMA are given in the next section.

5 MODERN APPLICATIONS

51 Elements of Communication, Modern Technology and Information Transfer

The information transfer, despite automation and developments in information technology is still very much dependent upon the seven basic elements of communication: speech, hearing, (listening), writing, reading, perception, cognition and reaction. The new technology and other devices may accelerate or facilitate one or more of these basic processes, but they do not and cannot replace them. As said by Mackeller these new devices are "aids to cognition but not substitute for cognitive processes"⁴ In this context, it is evident from various sections of

this paper that there is no other device which is more effective than the intellectual tool of SMA in almost all these basic elements of communication, especially 'cognition'.

52 Innovative and Creative Work and Information Analysis

In any creative work, the generation of ideas and concepts takes place through several ways such as: by classifying analysis, and by extrapolating from existing precedents etc. This is true in 'post retrieval processing' work or information analysis and consolidation (IA&C) work also. But, many times the precedents and known techniques are not available, and the situations are new. This is more so in the case of top management in business and industry as also in innovative and creative work. The main characteristics of the decisions at the top management level are: one time, non-routine, and unstructured etc.¹¹ Most of the outputs from IA&C in such a situation will form inputs for taking strategic policy/planning decisions which pertain to 'future'; and since decisions pertain to future, several assumptions are to be made in the absence of information.

As a result, when precedents are remote, the 'similarity/dissimilarity' of ideas/concepts will be apparent only at a *high level of abstraction*.

This process of thinking, i.e. the process of abstraction to basic ideas simultaneously with the perception of the new relationship among ideas for effective presentation is required in IA&C work. The same process of thinking is also required in many creative works in other fields, including technology transfer, management etc. It has been experienced that with the aid of SMA it is possible to achieve a high level of abstraction to observe, identify, analyse and perceive new ideas and relationships. Besides, mnemonics may even trigger creative ideas.

The three cases in point are discussed in the succeeding sections: Sec 53, 54 and 55.

53 Corporate/Business Plans—Case Studies

For the purpose of improving the structure and presentation of Corporate Plan and individual Functional Plans, SMA was used in an analysis of the past 3 year corporate or business plans of a company having a turnover of about Rs 150 crores and employing about 22,000 personnel. The exercise was also designed to issue guidelines in incorporating a revised struc-

ture of the plans, to various task-forces to help them in preparation and presentation of their respective Business Plans of the units/profit centres (which were later to be integrated to form a comprehensive (Corporate Plan).

It has been felt, and confirmed by Neelameghan⁶, that such an improved structure of the plan would help the heterogeneous groups connected with task forces in:

1 Conceptualising the subject or task as a whole, indicating the components and the inter-relationships among them, thereby helping them to gain a perspective view of the area of concern as a whole. Once the conceptualisation of the field or task takes place, it is easy for the task force for data/information collection, organisation and reporting on various components of the task and to prepare the required plan; and

2 Visualising how the components (sub-tasks) fit into the broader pattern of the total mission (such a vision is most beneficial for those undertaking a particular sub-task)

The outcome of the study under reference was that a General Structure for *Functional Plans* (such as manufacturing plan, marketing plan, procurement plan) and 'General Structure for *Corporate Plan*' were evolved, which were structured and organised using SMA.¹²

Illustration. The 'General Structure for a Functional Plan' is reproduced in Table 4 below side by side with the 'structure' for one of the Functional Plan, viz. Manufacturing Plan for the purpose of comparison. The manufacturing plan has been prepared using the 'General Structure for Functional Plan'. Likewise other functional plans such as marketing plan, procurement plan can be prepared by using the general structure:

It is observed from the Table 4 that the ideas representing in Chapters 1 to 7 (see numerals in the Table) in General Structure are followed in the specific functional plan—Manufacturing Plan'.

Further, if we compare the above table with Table 1 in Section 21, it is seen that the structure is in line with ideas and sequence that results after applying SMA.

Thus SMA finds use in facilitating analysis, preparation, presentation, structuring of Corporate and Functional Plans in Business and Industry.

TABLE 4

General Structure for Functional Plan		Structure of Manufacturing Plan	
Chapter/ Sec	Elements/key areas	Chapter Sec	Elements/key areas
1	Objectives	1	Objectives —Achievements sought —Quantification of achievement
2	Environmental Appraisal	2	Marketing Environment Appraisal
3	Functional or Unit or Divisional/Appraisal	3	Internal Assessment (past performance; —product-wise—production capacity and utilisation
4	Strategy	4	Mfg strategy Manufacturing capacity vs. marketing plan (i.e. Prodn Requirement Capacity & Policy
5	Assumptions & Forecasts	5	Assumptions & Forecasts
6	Tactics/Action Plan	6	Tactics/Action Plan (Cost/Waste Reduction Plan Labour & performance standard incentive proposals Quality Control, Modernisation & Expansion Plan. Man-power plan etc.)
7	Contingency Plan (Including alternative strategies, and specific Plans, if any)	7	Contingency Plan
		8	Miscellaneous

54 Project Planning and Implementation

PERT/CPM or Network Technique is one of the modern management techniques widely used in planning, scheduling and control of projects in any industry or any tasks. *The first step* in the application of network technique is to list out the important activities and salient features of the task on hand and examine the sequence in which the activities are to be performed. The SMA is also applicable in this first step, in that the SMA is helpful in determining the activities and establishing logical dependencies and sequence among the activities, owing to proper appreciation of their inter-relationships. (So that

time estimates schedules, critical path, manpower utilisation and cost factors can be built into it in succeeding steps for monitoring and reviewing the progress for effective and timely project implementation).

55 Technology Transfer Agreement

Technology transfer is the process by means of which the proven technology available with the donor organisation (any commercial plant or laboratory) is transferred to a recipient organisation (a manufacturing company or industry) for commercial production. (The donors or recipients may be from the same or different country, but mostly the donors belong to technologically advanced countries). The technology transfer is achieved by the receipt of Process Documents; Basic Engineering; Design Package; Detailed Engineering Design Package; Operating Manuals and back-up assistance in the supervision of manufacturing, testing, installation, commissioning (start-up) and proving guarantees of equipment and plant.

The crux of the activities for effecting technology transfer is securing a Foreign Collaboration through a technology transfer agreement. For this purpose a basic plan or a draft document has to be prepared which will act as a framework for:

- (a) holding discussions with foreign collaborator for preliminary exploration of the areas of mutual interest (and to prepare a 'Memorandum of Understanding)
- (b) determining the scope of various key areas and critical activities, including the areas of technology transfer mentioned in the previous para; (First para of sec 55).
- (c) formulating various options to be studied in each of the key areas which are listed in the basic documents as per (b);
- (d) deciding on the various options studied as in (c) to prepare a 'Draft Technology Transfer Proposal' before signing and entering into a Foreign Collaboration Agreement, and
- (e) evaluating the offers of technologies, if there are more than one offer.

The identification of key areas/activities, and structuring and organising them in a helpful order for using as a *framework for above purposes* can be done by using SMA.

Case Study. Such a framework which is simple but very effective has been successfully used in different stages of foreign collaboration—right from initial discussions to entering into a foreign collaboration agreement—in some diversification projects worth several crores in a large private sector company in India.¹⁰ One of the surprising and rewarding discoveries in this case study is that the structure and sequence of ideas forming such a *framework* is identical with the structure and sequence of ideas resulting from the application of SMA.

56 Industrial Coding Systems

The requirement of different classification and coding systems for electronic storage and retrieval in information industry need not be overemphasised. Besides, such coding systems are also needed in manufacturing industry; for example: Group Technology (GT) is one such system. Three aspects of this systems, i.e. its use in design, production and purchasing functions are given below:

1 The potential benefits that can be achieved by the design by using the GT are: "GT coding of parts is useful in efficient retrieval of previous designs as well as for design standardisation. These features help speed up the design processes and curb design proliferation".

2. GT is also used for 'Cellular Production' and for required sequence of parts family in production, planning and control function in manufacturing industry.

3 Relying on GT coding of purchased components and raw materials, and on information from the production planning systems, the Purchasing Manager can obtain statistics not directly available with the traditional parts numbering system. GT can help reduce proliferation of purchases of different kinds of parts; e.g. by identifying components that serve the same function, it can also list identical parts for which designers have specified different brands.³

In these cases, if SMA is consciously applied in designing the GT Code, the above mentioned benefits will be manifold and the systems using them will be more efficient and effective in meeting their goals. It is said that the reason for a very effective coding used for 'part Numbering System' now vogue in HMT Ltd is the involvement of Dr Ranganathan in the initial stage of HMT's establishment.

6 BASIC SKILLS FOR SOLVING PROBLEMS OF INFORMATION MANAGEMENT: SMA AS A BUILT-IN MECHANISM

The three basic skills required in solving critical problem of information management pertain to:

- (a) reducing the 'volume' and 'complexity' of the flood of information/knowledge/ideas, i.e. controlling the *generation* of ideas.
- (b) understanding the thought content.
- (c) interpreting the thought content which facilitates *regeneration* of new information/ideas.

All the three basic skills are offered at once by SMA.

First, SMA as mentioned earlier will facilitate identifying the similarity of ideas recognisable at great depths in any subject, beyond the reach of natural language and hence act as *quick indicator of the pattern of ideas* in the vast inflow of literature. This will enable the information personnel to keep pace with and in controlling the 'volume' and 'complexity' of problems.

Secondly, the application of SMA results in the understanding of the problems and their clear definition, and in evolving solutions to such problems by *grasping ideas* or contents of any subject. The ability to distinguish the 'form' and 'contents' of any situation can be gained easily by going deep into the seminal level of the subject or problem and discover the similarity/dissimilarity of the ideas in the context, irrespective of the 'terminology' used for expressing such ideas in the verbal plane.

Thirdly, SMA helps greatly in achieving the actually needed or intended *interpretation* of the thought content. Moreover, the interpretation so achieved can be re-structured while rendering post-retrieval processing work or in the preparation of the information centres 'products and services'; thereby helping and accelerating the *regeneration* of new information/ideas.

As such conscious use of SMA will certainly act as built-in mechanism to solve various problems arising out of information management.

7 UNIQUE TOOL FOR DECISIVE ACTION AND EVERLASTING VALUE

71 *Unique Tool for Decisive Action*

Above all, unlike other contribution of Ranganathan, SMA is unique, and stands apart from his other contributions. This is because it is not a theory or a teaching or a postulate but more than that—it is a tool for *decisive action* in any field and situation (as revealed in the cases in the foregoing section personality, matter, energy, space and time).

72 *Everlasting Value of SMA*

From the statements of Piaget and Inhelder, William H. Kilpatrick, and Bertrand Russel, it was inferred that:

1 The mode of thinking/learning among normal intellectuals is substantially similar;

2 The mode of thinking/learning among normal intellectuals has remained substantially in a similar pattern of several thousands of years; and for this reason;

3 The probability of a sudden change—that is, a mutation—in the mode of thinking/learning of a majority of normal intellectuals in the immediate future is quite low.⁹

Therefore, if any structure, or framework with certain sequence of ideas which is parallel to the mode of thinking/learning among normal intellectuals is constructed (or discovered) its value will remain unchanged for several thousand of years. In this sense, the value of SMA is *everlasting and eternal* as the sequence of ideas and the analytical frame work which results from SMA also parallel the mode of thinking learning of any normal intellectual.

Moreover, case studies¹³ on works (including classics) of well known authors (including some Noble Laureates) in fields other than library and information science revealed that other authors also use, consciously or unconsciously, SMA as mode of presenting and structuring their texts in documents and lectures. This reinforces the support to SMA's everlasting value.

8 CONCLUSION

1 The SMA is useful in almost all facets of information management—right from classification to information handling, transfer, dissemination and absorption of information/ideas

which is the ultimate goal of our profession.

2 The SMA offers three basic skills for 'information management': Controlling the generation of ideas by reducing the 'volume' and 'complexity' of the flood of information/knowledge/ideas; Understanding the thought content; and facilitating the regeneration of new information/ideas by providing a means to interpret the thought content.

3 Further, as pointed out by the advantages and by the case studies, SMA as a superb and useful analytical framework and model has myriad applications which include: information technology, communications, systems analysis and problem solving, innovative and creative work, information analysis and consolidation work, structuring and preparing corporate and business plans, project implementation, technology transfer agreements and industrial coding systems like GT. Besides, these case studies also indicate that SMA is compatible with modern changes/applications.

4 Fortunately, SMA is one such device to facilitate 'seven basic elements of communication' which cannot be replaced by any of the devices and tools of modern information technology. Moreover, an exciting and surprising characteristic of SMA is that its value is everlasting and unchanging.

5 Above all, SMA is a unique tool/technique for *decisive action* in any field.

6 Consequently the SMA provides an avalanche of opportunities to professionals in any field for improving their performance. As such, acquiring proficiency in this simple and inexpensive intellectual tool is a valuable asset to anybody.

7 It is, therefore, necessary that the information specialists and other professionals must take closer look at the implications of Seminal Mnemonics Approach to realise the substantial and sustainable advantages and applications, and discover new potential applications. Research in this direction has to be undertaken to explore the usefulness of this powerful technique which is a gift from Ranganathan.

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5. 3Impact of Scientific Management on Ranganathan's Philosophy: Some Observations

NARENDRA KUMAR and HARISH CHANDRA

States that the applicability of scientific management in library science was initiated by Dr S R Ranganathan. He transformed the traditional approach to library administration by creating a pattern of scientific planning. Also introduced the concept of functional planning by analysing the universe of library works into various isolates and then synthesizing into library function. Dr Ranganathan has thus not only cultivated a subject but has also established the subject for cultivation by scientific methods.

INTRODUCTION

In fact we are living in the era of 'Managerial Revolution' in which the harvesting of fruits of technical advancement is virtually dependent on the skill of the management. The concept of management has gone under a radical change by the emergence of complex organisation to meet out the needs of today's society. The dependency of good management is increasing day by day on scientific principles, theories, laws, tools and techniques. Deduction and evaluation of normative principles to guide and evaluate every area of the subject make the base for its scientific management. The scientific management is a method/technique by which we can gain the maximum output with minimum efforts at the operative level.

The role of scientific management in various disciplines has taken the shape of a movement the world over. Numerous thinkers interpreted its varied roles in various subjects. Ranganathan's approach in the field of library science was as a creative idea of a scientist. In the words of late Maurice Gwyer, former Vice Chancellor of Delhi University and the Chief Justice of India "He is the father of library science in India" and Sayers called the present age is the 'Age of Ranganathan'.

2 SCIENTIFIC MANAGEMENT AND ITS PRINCIPLES

Frederick Winslow Taylor (1856-1956) has coined the concept of scientific management and is renowned as the father of scientific management. The phrase 'scientific management' is derived from two words 'science' and 'management' or in other words the inclusion of scientific methods in the management. The introduction and application of scientific methods in the management of an organisation/profession is called the Scientific Management. Dougherty and Heinritz¹ have defined the scientific management "the application of principles and methodology of modern science to the problems of administration", Scientific management was developed by Taylor and his associates and in Taylor's view, scientific management leads to systematic and optimal situation in a service organisation.

The origin of scientific management could be traced on the basis of three major corrective approaches, viz.,

- (i) to introduce systematic and objective criteria to follow the practice in work;
- (ii) to design and develop techniques and methods for conducting the systematic work;
- (iii) to bring out the much needed cooperation.

Taylor's thought of cooperation between the management and workers was through the application of scientific methods.

He believed that scientific methods should be applied in selecting the personnel, in determining their jobs and in creating an understanding between the management and workers that would improve the productivity and efficiency of an organisation.

Initially Taylor listed four guiding principles for the best type of management. These are—

- (i) Daily defined tasks
- (ii) Standardised working conditions
- (iii) Reward for success
- (iv) Penalty for failure

Later on, these four principles of scientific management were modified by Taylor himself and a detailed discussion about these principles is given in his book.² These may be summarised as:

- i the development of a science for each element of a man's tasks which replace the old method of 'rule of thumb';
- ii the scientific selection of personnel for each particular

- task and then progressive development of the personnel through teaching, training etc.;
- iii the bring of science and scientifically selected and trained personnel together, and
- iv the equal division of work between the management taking all responsibilities for planning and coordination for which it is better fitted.

Thus, the scientific management is directly concerned with the planning, controlling and execution of all organised human activities in different operations/processes of an organisation. In brief, the concept of scientific management means a systematic, reliable and accumulated knowledge which facilitates the personnel of the organisation.

3 APPLICATION OF SCIENTIFIC MANAGEMENT TO LIBRARY OPERATIONS

Scientific management is not only confined profitably to the industry and business but also is being used in the public services even which do not have a profit motive. Scientific management is one of the outstanding achievements in the early twentieth century to introduce its application in the field of library profession. The principles of scientific management can be profitably applied to the library operations which are amenable to proper analysis.³

- i Frequently performed jobs, such as duplicate checking, typing book orders, classifying, book numbering, reproducing cards, filling cards, book charging and discharging and book shelving.
- ii Repetitive jobs, involving reoccurrence of same steps each time a job is performed such as book charging and discharging.
- iii Jobs requiring frequent movement of people or equipment, such as physical arrangement between acquisition and technical sections, public catalogue, major bibliographical tools, reference, lending and circulation sections.
- iv Jobs with bottlenecks, such as delay caused in labelling or confusion in deciphering call numbers written in ink on the spine of the book.
- v Jobs involving large amount of money, such as provision of reference service in a large library. Job costing or cost accounting is very useful in such a case.

To analyse any library task we have to look for the diagnosis of the problem by analysing the present operation and evaluation of past experiences; gathering the data by formal/informal discussions, observations (casual/general), sampling and surveying etc.; developing an improved method by eliminating the waste and unnecessary processes, combining the homogenous processes, measurement of time and motion study; increasing the efficiency of workers through the scientific selection and training; evaluation of equipment and materials utilised on the basis of standardised library norms; putting the improved method into the operation for its verification as an appropriate operation to handle the problem. This indicates that scientific management has its vital role to manage the library. Scientific method is very helpful to improve and enhance the routine efficiency. It is also a useful tool for library personnel management and financial administration. The scientific management provides us work analysis or a job which is a key to the modern job classification. As a result of this analysis the executive officer intelligently and precisely can know that what he can and should expect from a worker. This provides him with a yardstick to measure the work performed by a worker.

There are very few libraries which are related with the concept and practice of the scientific management. Hartz⁴ discussed the conceptual role of scientific management in the library operations. The most obvious target of the management studies is concerned with the technical services. Order routines, processing and circulation control involve many repetitive tasks. Involvement can be dramatic and new equipment and materials are readily available. Reader service, however, should not be ignored. The location of shelving, arrangement of collection, charging and discharging practices are the few examples of the areas of study.

4 RANGANATHAN'S SCIENTIFIC APPROACH

Science is essentially a methodology, an attitude of mind, or even a mood which is not always constant. According to Ranganathan⁵ the science is the name given to a domain in the universe of knowledge whose developments are characterised by a method called scientific method. A doubt is shown over this budding discipline, i.e. library science to call it as a science, is a subject of controversy till now. But the handling and treat-

ment of the subject by Ranganathan was made through scientific approach. Shiyali Ramamrita Ranganathan (1892-1972) was the greatest thinker on the library science in the present century. J.H. Shera⁶ says that Ranganathan has struck the most fundamental problems of the library science in a way that had never been attacked before. Ranganathan had always tried to dissect the problems step-by-step till it admits no further branch/division. Whenever the problem was sensed by him, he tried it to process in the spiral of scientific method⁷ and made to pass it through the following four phases:

- i Empirical phase
- ii Hypothesizing phase
- iii Deduction phase
- iv Verification phase

The scientific approach makes the mind mature and provides the direction to reach the result with the aid of a few but simple principles and devices. According to W.H. Phillips,⁸ the name given to these devices reflect Ranganathan's scientific approach which compel him to give the names to the new concepts as they are discovered. To study the whole, he studied its parts. What, why and how have been used by him to face the problem, indicate the base for scientific and rational approach. How is mind has attuned towards the scientific thinking is described by Ranganathan⁹ himself as "prior experiences in the scientific study and pursuit induced a sense of revolt against having to hold in memory and deals with myriads of unrelated pieces of information and" Vickery¹⁰ considers the scientific approach to his classification as his most enduring contribution to the librarianship. Ranganathan has shown that how classification has become a science by quoting Palmer from a review title 'New vistas in classification' published in October 1944, in Library Association Record. Sayers¹¹ finds his statement of canons in formal mathematical shape of the process and a discourse on terms. Mathematics as a tool was fully applied by him to solve the problems of library science. Never before him were used the mathematical formulae to derive the quantitative conclusions concerning to the profession. The Library Journal reviewed the Prolegomena to library classification as philosophical dissertation of a mathematician and a scholar. Foskett¹² compared it with Principia Mathematica of Whitehead & Russel. Logically a parallism between the classification and mathematics is deeply observed.

Ranganathan was equally successful both in originating and postulating at the one end and in initiating, motivating, directing, planning and achieving the objectives at the other. He was expert in deriving his objectives, gathering the relevant information, planning into different phases, taking the decisions boldly to achieve his objectives. The proof of his expertise in these managerial attributes was clearly represented by his institution where no body was as his opponent.

The influence of science on his terminology is not only conspicuous but also determine his methodology. According to Foskett¹³ Ranganathan has developed his terminology in a scientific manner/fashion; much of this is now widely used. Like a shrewed scientist, he also used the abbreviations in his terminology like:

FC = Fundamental Categories

AD = Alphabetical Device

CI = Common Isolates

2P2 = Second Round Second Level Personality Facets.

A more scientific approach to determine the size of library personnel, Ranganathan¹⁴ has suggested a criteria for estimating the size of staffing:

- i Formula for the staff of different sections
- ii Formula for total professional staff
- iii Formula for non-professional skilled staff
- iv Formula for non-skilled staff

5 RANGANATHAN'S CLASSICS—A REFLECTION

Ranganathan's contribution in library science is immense and unique. Ranganathan originally was a mathematician and the impact of him as a mathematician is clearly represented by his valuable contributions. He assimilated to the utmost fundamental methods and tools of physical sciences. Consequently, science has a dominating influence over his writings. He always wrote in a scientific way and mathematical precision. Gauri¹⁵ calls Ranganathan's transition from one sentence to another sentence like mathematical steps. Ranganathan had made in his contributions the deduction and evaluation of normative principles to evaluate and guide every area of library science on the basis of experiences gained after surveying over a hundred of British libraries.

Ranganathan's contribution is characterised with the classical

works. The fame of Five Laws of Library Science is not only due to the enunciation and elaboration of basic laws but also inclusion of a chapter on scientific method. The spiral of scientific method reflects clearly and precisely his scientific approach. Besides the Five Laws of Library Science, the outstanding contribution to library science is his *Prolegomena to Library Classification*. It is most precise, theoretical, practical and comparative exposition of library classification theory. *Colon Classification* is recognised as a milestone in the development of intellectual processes involved in the organisation of information. Its notations are fully conceptualised and based on nuts and bolts for synthetic pattern. The concept of five fundamental categories, postulates and principles for facet sequence and sequence of isolates in chain and array and the devices the base for analytico-synthetic character. The *Classified Catalogue Code* is characterised with the treatment by the normative principles as general laws, canons, and principles, etc. Chain procedure is interesting feature of the code. Ranganathan had a firm assurance regarding cataloguing which has now emerged from the stage of hand-to-mouth and rule of thumb. It has entered into the stage of scientific method. *Library Administration* is an encyclopaedic work on the library operations. The history and development of this classic illustrates the characteristic way of working with staff. It is a compendium of office procedures, planning, job analysis, routines, library finances, budgeting and accounting.

Thus, the works contributed by Ranganathan in the field of library science are unique and well organised.

6 CONCLUSION

It is concluded that the principles of scientific management are concerned with the 'distribution of the responsibilities' or 'its decentralisation'. The applicability of the scientific management was initiated in the field of library science by Ranganathan in the early twentieth century. Ranganathan transformed the traditional approach to library administration by creating a pattern of scientific planning. He also introduced the concept of functional planning by analysing the universe of library works into its various isolates and then synthesizing into a library function. The work of Ranganathan is almost identical with that of a

cultivating the subject and also establishing the subject for the cultivation by scientific methods.

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5.4 Madras University Library: Ranganathan's Laboratory

P.A. MOHANRAJAN

Presents an account of Dr S R. Ranganathan's 20 year of significant career as the first librarian of Madras University Library. Madras University Library served as an 'Experimental Laboratory' for him as it was here he tested his ideas and techniques, provided a basis for the introduction of his techniques and services, carried out improvements and deduced theories. Areas in which experiments were carried out were—extension of library facilities, library working hours, open access system, reference service, etc. Significant contributions were made towards development of a theory of classification and cataloguing. In 1929 a library science school was also started to provide for trained manpower in the country.

What is the life of a literary or scientific man, and where are we to find the history of it? In his works, Newton and Euler are their own best biographers
—Henry Hunt

1 INTRODUCTION

S. R. Ranganathan is a leading luminary of library and information science. Eugene Garfield remarked in his recent speech at the Madras University Library that, "Ranganathan is to library science what Einstein is to Physics."¹

Peter Lazar said of Ranganathan, "The late Dr S R. Ranganathan was one of those renowned librarians who contributed substantially in theoretical investigations and in recognition of library and information science as a scientific discipline."

Ranganathan's pioneering career of forty-eight years (1924-1972) was fruitfully spent to modernize and professionalise library and information science in India. He was convinced of the great relevance of library science in working for social betterment and the uplift of the community and in working for spiritual perfection. With this inspiration he entered this profession. He realized that it had fulfilled many of his unexpressed

hopes he has developed steadily from his student days onwards. To quote his own words:

It was the University of Madras that first recognised that maintenance of proper library service is a professional calling if the university library should develop along right lines into a service-library capable of intimate resonance with the research aspiration and activities of the teachers and the taught alike. This far-sighted action of the University of Madras in the appointing of a university librarian with the status comparable to that of university teachers and with professional and academic qualifications of a higher order marks a turning point in the library history of India.¹⁴

The scope of this paper is to present Ranganathan's twenty years of significant career as the first librarian of Madras University Library (MUL). In fact, it can safely be stated that Madras University Library had served as his *Experimental Laboratory*. The paper thus aims at: (i) How Ranganathan tested his ideas and techniques; (ii) providing the bases for the introduction of his techniques and services; and (iii) the improvements that he had effected and how he deduced his theories.

The life and career of this great pioneer of library movement in India have objectively been portrayed in the following pages.

2 ORGANISATION OF THE MADRAS UNIVERSITY LIBRARY

After spending six and half years (1917-1924) as an assistant professor of Mathematics in various government colleges, Ranganathan became the first librarian of the Madras University Library on 3rd January 1924. In fact he had applied for this post with much reluctance since one of his colleagues was pressing him to apply for this post. Though he was fascinated by books and libraries right from his student days, the atmosphere of Madras University Library at that time was dull and suffocating. As a teacher he enjoyed teaching and loved the company of his students. Further he was deeply interested in research in mathematics. So at the end of the first week he wanted to go back to his teaching profession. But, he was practically forced by the Principal of the Presi-

dency College to continue in this field. It is ironic that this man who later single-mindedly devoted his life to library science, was practically forced into the field against his will.³ Later he made up his mind and accepted the challenge and decided to reorganise the twentyfive year old Madras University Library built with 24,063 volumes. He was provided with only one matriculate and four under-matriculates to assist him in the reorganisation. He spent two fruitful decades (1924-44) here and this experience laid the foundation for his glorious career.

3 STUDY TOUR TO EUROPE

The University authorities deputed Ranganathan for a year (1924-25) to Europe to study library science and to observe library services in European libraries. His training and the experience he gained at University College, London, gave him a full exposure to library science. His apprenticeship training was at Croydon Public Library, under an eminent personality, W.C. Berwick Sayers. As B.S. Kesavan puts it, Sayers quickly sensed the prodigious qualities of his Indian "Student" and gave him unreserved support and commendation.⁴ After his training, Ranganathan also visited more than hundred libraries in Europe to observe the various services of these libraries. Such experience made him think of returning to India with a mind steeped in new ideas.

4 EXPERIMENTAL LABORATORY

41 *Madras University Library*

Ranganathan upon his return from Europe, concentrated his attention not only on improving the library, but also on devising new methodologies and techniques and laying the foundation for the theory and practice of studying all aspects of Library Science. He built up the magnificent library of the University, rendering very efficient and effective library service, the like of which was unknown in the country in those days.⁵ MUL, then comprising 32,000 volumes and with an annual addition rate of 6,000 volumes, became his experimental laboratory. His pragmatic research techniques, viz. observation, case study method, use study, user survey etc., provided him with a scientific base. He always expected the feed back from his user community since he realised that they were the means of testing

his ideas.

42 Normative Principles

421 Guidance for Reformation

Ranganathan's powerful insight into the library practices of European libraries had developed an urge in him and influenced him to reduce the diverse library practices into a few fundamental laws. In about three years, the Five Laws of Library Science took shape.^{5,11} Ranganathan called them as normative principles constructed out of deceptively simple statements. These principles, like Newton's law of motion in Physics, form the nucleus of the entire gamut of library functions and services. Ranganathan demonstrated that the observation of the normative principles was the first step in putting library work on a scientific basis.³ He published his seminal work, *Five Laws of Library Science* which preserved the conceptional approach, to elaborate on the foundations of librarianship based on these laws, in 1931. Even today we find that these five laws are reigning supreme not only among the library professionals of India but also among the international practitioners and theorists.

422 Experiments in Extension of Library Facilities

Ranganathan made out full justification for the first law, "Books are for use", through his experiments in extending library facilities to a large group of users at MUL. In the first instance only Fellows of University, the staff of affiliated colleges and registered graduates were allowed to use MUL. The total number of readers was reportedly only ninety. When the privilege was extended further to the other teachers and under graduates in 1936, the users total went up to 1,636.⁷ This was further extended to the graduates of the University of Madras living outside the city of Madras.

423 Experiments with Library Working Hours

Another radical change he made touched on the working hours of MUL. The library which was earlier kept open from 11 a.m. to 5.30 p.m. on all days except Fridays and first Saturday of each month from 1909, extended the working hours in 1934 from 8 a.m. to 3 p.m. after conducting several experiments with the trends of attendance of the users.⁷

424 *Open Access System*

Ranganathan observed that each reader had to waste at least half an hour at the MUL counter. His mathematical mind started computing the amount of time wasted by the users over a full year and found it to be 36,000 man-hours per annum and this was equated to Rs 18,250 as per the wage scales that prevailed during 1928.

On considering the loss of man house (user time), he came to the conclusion that the loss of a few books through the implementation of the 'open access' system would be preferable, if it could avoid the loss of man hours. He made a proposal in the MUL committee for the implementation of the open access system. Finally MUL implemented the open access system in January 1929.⁷ As a result each found his book readily with the help from open access... and every book found its reader. Above all the time of the reader and staff was saved.⁷ The local Press gave a very good reaction to this idea.

The introduction of card charging system MUL in 1927 as a measure to simplify the issue records and the three card system in the Periodicals Section in 1934 also justified the fourth law.⁷

425 *Experiments with Reference Service*

It is known from the writings of Ranganathan that rendering efficient and effective reference service was a desideratum for him even from his student days. He has put his desire in the following statement. "During all the six and half years as a teacher the pleasant experience of seeing the students, getting satisfaction from the library services, inaccessible in my student days, gave me vicarious satisfaction. I now realise that I had integrated in those years the function of a teacher with that of a reference librarian. I had been spending much of my time in the area of over-lap between the region of a teacher and of a reference librarian".¹⁴

During his stay in Europe, he observed that the reader guidance and reference services were rendered through an organised service called 'Information Desk Service' which provided a list of references upon enquiry. On his return to MUL, he observed poor attendance in MUL due to the absense of reference service and reference librarian. He found that even the 'Potential consumers' either did not come to the library or even after coming to the library had to go away without drawing the

best possible help, due to the absense of provision of reference librarian. This made him think of reference service something more than what he had witnessed in England. He finally decided to introduce reference service, without asking for additional staff. He experimented with the art of rendering reference service. He found that this had evoked a good response from students and teachers and this made him busy with reference services all through the day. The inflow of potential consumers increased all of a sudden. Then he made a proposal for the introduction of reference service to the MUL committee. At last in 1930 he implemented the kind of reference service he had been longing for as a student, teacher and as an adult user of libraries.¹⁴

"An outstanding feature of this Library is the institution of a reference section consisting of four graduates with sound library training marked out for 'service of readers'. They helped research workers by preparing special bibliographies on demand and by helping in the location of references."¹⁵

426 Enchanting Hum of Life

"The University Library knows no holiday. It works all the 365 days of the year, no matter whether it be a Sunday or a festival day or a sacred day. It works 13 hours each day. It opens at 7 a.m. when people who go to the beach for their morning constitutional can refresh their intellect as well. The serious full timed research workers will be found in the reading rooms all through the day. Again, after the evening walk in the Marina, it is possible for anybody to step into the comfortably in library and do some solid reading till 8 p.m."¹³

427 Experiments with Administration

An administration section was set-up in MUL to look after acquisition and processing of books and to carry out administrative routines. Ranganathan broke down the entire functions of library administration and identified approximately one thousand components. He incorporated these functions in his eminent work 'Library Administration' which was published in 1935. By practically identifying the facets of library administrative function, he proceeded to simplify and streamline it into standardized forms.

428 Classification Experiments

Ranganathan's outstanding contribution is obviously Colon Classification. It is acknowledged by one and all as a self-perpetuating classification based on normative principles, laws, canons, postulates of facet sequence, rounds and levels, facet analysis, phase analysis, zone analysis, sector notation, group notation etc.

The history of classification includes one century old events. Dewey Decimal Classification was the first heroic step in classification history introduced in 1876. In those days research activities were concentrated on pure science, religion, philosophy etc. Humanities, social science and literature were taught mostly in Universities with much importance.

Ranganathan found that the development, growth and extension of the universe of subjects were very slow before the twentieth century. He had identified that a sum of one hundred and eighty major new ideas and subjects had been created during 1701-1900. But during 1901-1950 he found the growth rate of ideas and subjects had doubled and the figure given by him was three hundred and ninety one. Most of the major innovations had already begun to occur every year starting from the fag end of nineteenth century and continued till 1920s. The books reporting the above activities were published within a manageable limit. The manpower engaged in research activities were not so many.

DDC scheme was suitable and sufficient to classify the documents in those days. In due course, increased research activities influenced the growth of universe of subjects and natural language. Being an enumerative classification it could not enumerate all possible subjects and this caused severe rigidity. The subsequent editions of DDC and the Universal Decimal Classification scheme, were the attempts to reduce this rigidity. Ranganathan's visit to England stimulated another important line of thought. The more he learned about the orthodox Anglo-American classification systems the more convinced he became that they were seriously flawed.

Ranganathan had identified the first one hundred years as. Pre-faceted period (1876-1896); transition to faceted period, (1897-1932) and freely faceted period (1933-1975).

In this context it is proper to refer to one particular incident in the life of Ranganathan that changed the history of classification. When he was in London and visited one depart-

mental store 'Selfridge', he noticed a toy erector set. There he saw a sales person create an entirely new toy in each new combination of metal strips, nuts and bolts. His logical brain captured the provision for dismantling and reassembling facility. Like Newton's falling apple, this induced his inner thinking and he conceived the idea of synthesising the concepts to form a specific subject. Thus the concepts of faceted classification took shape in his mind.³

He started working on that and devised a scheme for trial and error purposes. During his return journey to India he took a copy of the printed catalogue of MUL comprising 30,000 volumes and made a trial of the scheme in classifying the titles in the published catalogue on slips.¹⁷

When he resumed duty in MUL he found that the books were arranged in alphabetical sequence. Immediately he rearranged the books in a classified sequence according to his scheme and waited for the feedback and reaction from the readers. Finally he noticed a few more points of helpfulness and incorporated them by adding necessary amendments to his scheme.

He developed composite numbers or readymade class numbers for the Indian Classics which included classics and sacred books, with the help of his colleague Prof. Kuppuswamy Sastri. As a result the celebrated Colon Classification (CC) scheme was published under the aegis of the Madras Library Association in 1933. This work was based on a course of lectures delivered under the auspices of the University of Madras at Chidambaram in 1929.

"This scheme has been in use in the Madras University Library for nearly ten years and has behaved admirably inspite of the large number of specialisation monographs which the library process."¹¹

The first edition of CC made provision to construct class numbers by combination of isolate numbers. Each of the facets in a Basic class was enumerated. In each facet foci were enumerated. However the sequence of facet formula was not attempted.

In the second edition of CC, revision of schedules took place in the following main and basic classes; Common subdivisions, Sound, Electricity, Technology, Biology, Public Health, Indian Philosophy, Sociology and Law. In Chemistry and Law the facets were rearranged. Anthropology was shifted from History

to Sociology. To satisfy the cannon of currency the terms 'Philology' and 'Politics' were changed into 'Linguistics' and 'Political Science' respectively.

The other features of second edition were as follows : "The digit '9' was made semantically empty to increase the capacity of an array. A new species of symbol Δ (Delta) was introduced to represent the main class "Spiritual Experience and Mysticism.""⁸

The schedule was tested against twenty eight cannons. Many of the other concepts, which helped Ranganathan to convert CC as a freely faceted/analytico synthetic classification scheme, dimly perceived in the first two editions. In fact these two editions contributed much to the theoretical study of classification.

43 Contribution to the Theory of Library Classification

431 Principles, Canons, and Helpful Sequence

Ranganathan is regarded as one of the foremost authorities in the theory of library classification. As a designer of a new scheme of classification, many of its guiding principles emerged and formulated in his mind in easy instalments. As and when sufficient number of them took shape, he deduced them into principles, canons and helpful devices. Finally an outstanding theoretical work in library classification emerged viz., *Prolegomena to library classification* in 1937. In 1944, two other important works on library classification i.e., *Library Classification: Fundamentals and Procedures* and *'Elements of Library Classification'* were brought out.^{3, 4, 5}

During his twenty years stay in MUL, Ranganathan had deduced 28 canons and a few other laws and principles. Some of these are extensions of Sayers. As a matter of fact, his theoretical contributions set a new trend in the theory of library classification which is evident even today.

44 Library Classification Terminology and its Development

441 Usage of Terminology in Prolegomena

Ranganathan had also developed the glossary of library classification terms along with the theory and practice of classification. K.N. Prasad accounts that a total number of 514 technical terms were used in the three editions of *Prolegomena*

to Library Classification. In the first edition he introduced 183 technical terms. He added 145 and 186 in the second and third editions respectively. The usage of such standardized terminologies refined his writings and uttered a faultless communication.⁹

45 Experiments with Cataloguing

451 Case Studies and Feedback

In India the concept of card catalogue came along with Ranganathan. He wanted to classify books and rearrange them according to his scheme and to design a catalogue for MUL. He believed that although most of the readers were unfamiliar with the classified systems, the alphabetical dictionary catalogue could be used to guide readers to the correct location in the classified catalogue.^{2,3} He collected a lot of case studies. He relied upon case study method for collecting data on improving the utility of library catalogue. He did not publish his conclusions in the form of papers. But he incorporated the feedback he obtained from his surveys in MUL catalogue and in more general form in his work *Classified Catalogue Code* which was published in 1934. To determine subject entries Ranganathan devised an ingeniously prepared simple method called 'Chain Indexing.'

452 Symbiosis between Classification and Cataloguing

He always thought of symbiosis between classification and cataloguing. His chain procedure was a breakthrough in subject retrieval technique. He deduced several canons for cataloguing.¹⁰

46 Ranganathan and His Staff

461 Team Work

Dr Ranganathan a virile, preceptive and determined person demanded hard work from his staff at all levels, but never spared himself. Indeed his energy and enthusiasm seemed boundless. At the same time he did not withhold praise and appreciation when he thought they were merited. The staff seldom had the feeling that they were working for him. Sharing his aspirations he could make his staff at all levels feel that they were being taken into confidence and that they were part of an

experimental team.

5 FIRST LIBRARY SCIENCE CURRICULUM IN INDIA

51 *Library Science School (MALA)*

The need for trained manpower to run academic libraries was felt very much. Ranganathan was instrumental in instituting a school of library science in 1929 under the the auspices of the Madras Library Association (MALA). Later, this school was taken over by the Madras University. Thus the seedling of Madras nurtured by MALA for the first two years was transplanted in 1931 from the nursery of the MALA in the fertile garden of the University.

52 *Development of Library Science Education*

In his introduction to Classified Catalogue Code he stated as follows:

This little venture is based on ten years of experimentation in the Madras University Library and on the valuable reciprocal influence gained by its being taught to students of library science during the last ten years.¹⁰

Thus it can be seen that Ranganathan initiated his attempts to professionalise librarianship and library education through his MUL experiments, in India. His involvement as an 'Academician of Library Science' paved the way for his 12 publications under the aegis of MALA. Thereafter he extended his endeavour in curriculum development in other Indian Universities. As Asha Kaula has rightly stated, "In India, the advance of professional education is nothing but Ranganathan's idea."¹

6 CONCLUSION

In the foregoing paragraphs, we have seen how Ranganathan faced the challenge of library service as a life-time work.¹⁴ Ranganathan left MUL in 1944 only to accept a series of appointments in other Universities and to step up his involvement in international activities. As the present Librarian of MUL, I have the proud privilege of trying to walk in the foot steps of this great Son of India.

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5.5 Ranganathan's Philosophy and Bibliometrics

I. N. SENGUPTA

Librametry was conceived and applied to various library procedures and practices by Dr Ranganathan. Defines Librametry and Bibliometrics and asserts that the two are to some extent analogous and synonymous. The difference being that librametry is involved with library services as a whole and not only with written materials whereas Bibliometric is concerned with publication pattern of written communication. States that most of the items listed under Bibliometrics fall within the domain of Librametrics. Suggests several steps to boost librametric research.

Preamble

The term 'statistical bibliography' was coined by E.W. Hulme¹ in 1923 which was latter in 1969 renamed as 'bibliometrics' by Pritchard² But if we carefully examine the different philosophical thoughts of Dr Ranganathan it will be seen that the basic approach of statistical bibliography, i.e. application of statistical methods in bibliography was in existence in different library practices consistently and methodically followed by Ranganathan as a librarian of the Madras University during the middle of the second decades of this century

1 GENESIS OF THE TERM LIBRAMETRY

Ranganathan³ conceived the concept 'Librametry' which was more or less analogous and synonymous to bibliometry. It was first introduced by him in 1948 at the Aslib's Annual Conference held in Leamington Spa when he was asked to comment on the lecture of Prof. Bernal by the then President of the Aslib Mr Henry Lemeister. Ranganathan argued that since application of statistical calculus has given rise to some disciplines with great potentiality like Biometry, Econometry, Psychometry then why not the librarians should utilise it and develop Librametry to streamline the day-to-day library activities for better library services to their clientele and also for the betterment of library profession as a whole. Ranganathan, being a

mathematician, foresaw wide possibility of the application of statistical and mathematical methods in librarianship and he himself started practising it to solve various library problems as far back as in 1925, more than 4 decades earlier to the term bibliometry.

He applied librametry to

- 1 determine optimal strength of library staff in different sections and their judicious distribution;
- 2 dispose reference queries;
- 3 systematised circulation of library documents;
- 4 develop and organise national and state library system;
- 5 determine the optimal size of a service library;
- 6 design library building;
- 7 distinguish service and dormitory libraries;
- 8 analyse readers' queries;
- 9 streamline acquisition system by analysing library documents, i.e. books, monographs journals etc.;
- 10 determine the most helpful sequence for classification of macro and micro documents; and
- 11 test the accuracy of catalogue entries by sampling technique etc.

2 LIBRAMETRY: ITS DEFINITION AND SCOPE

Though the term Librametry was coined, discussed and consistently practised by Ranganathan during his celebrated career as librarian of the Madras University and also afterwards, yet we are rather unfortunate not to get an exact, pin-pointed definition of the term from him. However, from the scope of Librametry as discussed and practised by him let us try to define it as 'Quantitative analysis of various facets of library activities and library documents by application of mathematical and statistical calculus to seek solution to library problems. Thus its scope not only covers different services and problems of libraries but also to the fundamental units comprising them, i.e. it is also concerned with the incoming and outgoing macro and micro documents of a library.

3 BIBLIOMETRICS: ITS DEFINITION AND SCOPE

Let us now examine the term bibliometrics. It was, as mention-

ed earlier, first used by Pritchard in 1969 in preference to an existing term 'Statistical Bibliography'. Pritchard² defined bibliometrics as 'The application of mathematical methods to books and other media of communications'. Fairthorne⁴ described it as 'Quantitative treatment of the properties of recorded discourse and behaviour appertaining to it.' Hawkins⁵ in his on-line bibliometric study interpreted bibliometrics as 'Quantitative analysis of the bibliographic feature of a body of literature.' More recently Potter⁶ defined it as 'The study and measurement of the publication patterns of all forms of written communication and their authorship'. Its scope, according to O'Connor⁷ and Voos, 'includes the studying the relationship within a literature (i.e. citation studies) or describing a literature. Typically these descriptions focus on consistent patterns, including authors, monographs, journals or subject language.'

4 BIBLIOMETRICS VIS-A-VIS LIBRAMETRICS

From the scope and definition of the terms librametrics and bibliometrics, it may be asserted that these two terms are to some extent analogous and synonymous. The former, however, has a broader scope because of its involvement not only with written documents but also with the library services as a whole. The latter, on the other hand, is more specific being concerned only with the publication patterns of written communications including their authorships. Because of active and consistent research work, bibliometrics today has made itself established as a viable, flourishing and sophisticated area of research.

It is an open fact that for any research topic to attain international recognition as a distinctive subject for scientific study, researchers must first develop a substantial and adequate general body of theory as its foundation or base. Gradually explanations of these theories are made through painstaking research work undertaken by a band of dedicated scholars of that field and also by researchers from related frontier disciplines. Bibliometrics lies between the border areas of the social science and physical science and therefore it has involved scholars from many disciplines. Since its inception it has attracted not only the librarians and information scientists, but also behavioural and social scientists and also scientists from different disciplines of physical sciences. As a consequence many of the well established scientific research methods including

mathematical and statistical techniques have been consistently applied for its conceptual development and theory building. As a matter of fact, its solid theoretical foundation has been laid very efficiently and effectively by the painstaking research work of pioneers like Lotka, Bradford, Zipf, Bookstein, Madelbrot, Hulme, Cole brothers, Derek de Solla Price, Vickery, Brooks, Narin, Naranan, Moravcsik, Dovrov, Vlachy, Garfield and many others who are all not basically librarians but belong to different branches of human knowledge. Because of the tireless efforts of these pioneers bibliometrics today has attained sophistication and complexity having national, international and interdisciplinary character. It has established itself as a viable and distinctive research technique for quantitative measurement of human knowledge. It has expanded enormously and naturally gone far beyond the jurisdiction of librarianship. It may be pointed out here that the term bibliometrics has another built-in advantage over librametrics, as the term got circulated in *Journal of Documentation*, a leading international periodical. As a consequence, it immediately drew the attention of many intellectuals in the field and eventually received quick and wide acceptance from many active workers engaged in research in this line. As a matter of fact, had Ranganathan published his philosophical concept Librametry in 1948 in *Journal of Documentation* or in a similar well circulated internationally reputed research medium, today the picture surely would have been different. Who can say that all work pertaining to citation analysis or statistical bibliography, which are now treated as part and parcel of bibliometrics, would not have been recognised as librametric studies? Nevertheless it is a rude fact that librametrics, one of the outstanding philosophical concepts of Ranganathan, had really missed the bus at the very time of its coinage and had failed to receive universal recognition and acceptance in spite of its great potentiality and therefore could not emerge today as a viable research tool in librarianship. Another reason for this, is perhaps its motivation and orientation are mostly confined to solve library problems and as such, unlike bibliometrics, it did not involve scholars from many other disciplines. It is rather unfortunate that no librarian, after this great thinker of library science, has so far come forward to take up librametric exercises as a follow up measure to solve day-to-day practical problems experienced either by him or by his users in the library.

Consequently after Ranganathan, not even a single outstanding research paper unfolding the potentiality of librametry has been published to inspire promising librarians to go ahead with librametric research, in spite of the fact that librarianship is traditionally a problem-oriented discipline. As a result, librametry today is nothing but a conceptual terminology and does not have any theoretical foundation.

However, as a librarian, I at least know my own deficiencies. I am, may be many others like me, not basically a scholar and as such not research minded. It is tempting to mention in this connection the observation of Williamson.⁸ He could notice amongst the librarians very little scientific study to solve the problems of library services and further had the guts to say bluntly that no librarian has proper training in scientific methodology. Echoing the voice of Williamson, Goldher⁹ advised the librarians to put more faith in the application of scientific methods to study the issues and problems of librarianship. This exposes a serious lacuna in the existing practices in librarianship, especially in newly developing countries where research work in library science has yet to gain sufficient momentum because of the facts stated by these two library pioneers. But whatever may be the reasons for less popularity of the term librametrics one will perhaps agree that all work pertaining to statistical analysis of bibliographies of written communications either in books or in periodicals along with their quantitative studies, which are at present classed under bibliometrics, very well fall within the domain of Ranganathan's philosophical concept 'librametrics'.

5 STEPS TO BOOST LIBRAMETRIC RESEARCH

Since the concept librametry was coined by an Indian pioneer, Indian Library Associations, societies and librarians at least should feel some moral obligation to initiate some positive steps to motivate research on this area of knowledge. I would like to raise some basic points for considerations of this venerable gathering.

- 1 The potentiality of librametric studies may be reassessed in the context of librarianship including library documents, problems and services and some norms may be set up to standardise its application.

- 2 Serious efforts may be made to reintroduce librametrics in

the main stream of librarianship. Here the university faculty members may perhaps play a vital role in popularising this concept among their M.Lib.Sci. students and inspire them to take up projects on librametric study in their dissertation work as a partial fulfilment of their M.Lib.Sci. degree. They may also help, guide and encourage the students to publish the salient features of their dissertation work in leading library science journals/for circulation and promotion of further research on the subject among fellow librarians.

3 Some agency, perhaps the ILA, the organiser of this seminar, may consider the possibility of launching a journal on the subject under a suitable name, say, 'Librametrics' with an international board of editors drawn from the distinguished librarians of different countries who have made it convenient to come to India in spite of their busy schedule to show their respect to the memory of the great Indian philosopher of library science.

4 Topics on scientific research methodology and elements of statistical calculus may compulsorily be incorporated in the curriculum of Library and Information Science at B.Lib.Sci. and M.Lib.Sci level in all Indian universities. This will encourage the future librarians to apply statistical calculus in their day to day library problems more assertively and scientifically.

5 Last but not the least, to encourage Indian librametrists, any of the Indian Library Societies, Associations, Training Centres may explore the possibility of introducing some kind of recognition in the form of an annual award or a medal for the best research paper on the subject as a token of our indebtedness to the great Indian Librarian.

In fine, I may mention here that circumstances, which were not under my control, deprived me of becoming a direct disciple of the great Indian Dronacharyya of library science. But I am definitely one of his Ekalobya disciples who was greatly influenced by his philosophical thoughts. So I shall be failing in my duties by mere suggesting some measures for promotion of librametric research or to popularise the terminology. I therefore take the privilege of this occasion to contribute a separate research paper on the subject in order to make the ball of librametrics rolling.

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5.6 Librametric Study to Re-Rank Scientific Periodicals

I.N. SENGUPTA and SHYAMAL MUKHOPADHYAY

To identify the most useful scientific journals in any discipline introduces three parameters, i.e. scientific interest, compactness of information content and scientific value of published papers. Presents a case study by applying these parameters to first ten microbiology ranked journals compiled by the author earlier. Taking 1969 as base year uses random sampling for counting words and pages from which derives the number of citations for each year. Recommends that all microbiologists should rely on the 10 ranked journals to keep abreast of literature. This list will also help librarians to select journals for subscription and documentation work.

1 INTRODUCTION

The idea 'Librametry' was conceived and practised by Ranganathan¹ in the middle of the second decade of this century. However, he coined this term publicly in 1948 during the ASLIB's Annual Conference held at Leamington Spa where he was asked to comment on the lecture of Prof. Bernal by the Chairman of the session, Mr Henry Lemeister, who was also the President of the ASLIB at that time. The term, unlike an analogue and synonymous term bibliometrics, did not receive wide acceptance and international recognition as no serious follow up research effort was made on the lines suggested and showed by Ranganathan. As a matter of fact, after the coinage of the term, no significant contribution on the subject was published to establish its validity and thereby popularise the terminology. Even the progenitor of this concept also did not publish any paper illustrating its scope and definition or research findings on a particular library problem in an international journal. Consequently the terminology is yet to gain popularity and acceptance among the library professionals. Recently Sengupta² defined librametry as a quantitative analysis of various facets of library activities and library documents by

application of mathematical and statistical calculus to seek solution of library problems. He also argued that statistical analysis of bibliography of primary and secondary journals which are today considered as one of the facets of bibliometry definitely fall within the perview of the librametry. Thus, the studies made by Cole³ and Eales, Hulme⁴, Gross⁵ and Gross, Allan⁶, McNeely⁷ and Crasnow, Gross⁸ and Woodford, Jenkins⁹, Henkle¹⁰, Brodman¹¹, Brown¹², Sengupta¹³ and many others are nothing but librametric study of scientific periodicals as all these contributions were based on simple statistical calculus to solve acquisition problem of a library. Librametric technique was used by Sengupta to quantify growth of literature and ranking of scientific periodicals in the field of bio-medical sciences. It is felt that there is a further scope for modification of those ranking list through librametric study to the best advantage of the research workers and librarians. In this paper, we are introducing three librametric parameters which will doubtlessly identify the most useful journals in any discipline according to scientific interest, compactness of information content and scientific value of published papers. As a case study, we are applying these parameters to the first ten microbiology ranked periodicals compiled by Sengupta¹³ earlier. The results of our findings are presented and discuss in this paper.

2 METHODOLOGY

We propose to introduce three new parameters in librametric analysis of scientific periodicals. We are confident that these parameters will provide a better guideline in assessing the overall importance of a scientific journal from the users' point of view. The parameters are worked out in relation to:

- i* Scientific interest of a journal in relation to the total number of articles published (say, D/A);
- ii* Compactness of the information content in a scientific periodical (say, C/A);
- iii* the scientific value of the papers in relation to compactness of presentation (say, D/C).

However, it is needless to point out that among these three parameters the third one will be by far the best criterion in

identifying the most important core journal from users' point of view. In these three newly coined parameters D/A, C/A, and D/C:

A stands for total number of articles published in a journal during a particular year; C denotes total number of words published in that journal during that particular year; and D is the total number of bibliographic citations noted in favour of that journal from the source journal(s) during that particular year.

The bigness of a library is judged not from its size, but from its use. Similarly the importance of a journal is better known from scientific interest of a journal, compactness of information content in a journal and also from the scientific value of the papers published in a journal. To evaluate 'A', 'C', and 'D' we have taken help of the citation data of first ten journals of the ranking list of microbiology compiled earlier by Sengupta¹³ (*vide* Table 1). Here we have taking 1969 as the base year for collection of data in respect of A, C and D. This is done in view of the fact that complete volumes of all the first ten journals (of Table 1) are available in the library where this study was undertaken. Let 'B' the total number of pages published by a journal listed (in Table 1) in 1969. Number of articles and pages published by all these ten journals were verified and noted for use. This would provide the actual numerical value of 'A' and 'B'. Now to calculate 'C' for any of the ten ranked periodicals of microbiology we have applied a method of simple statistical calculus, namely, the method of random sampling to select 100 pages from 1969 volume(s) of that journal. Thereafter total number of words printed in these 100 pages were accurately counted. If the total number of words in 100 pages for a particular journal (in Table 1) be C_1 , then the average number of words published per page in that journal would be $C_1/100$. Then the total number of words 'C' published by that particular journal during that particular year $C = \frac{B \times C_1}{100}$, where B is the total number of pages published by that journal during the year under reference. Naturally, the numerical value of 'C' will vary from journal to journal as the total number of pages and also the average number of words published per journal will vary due to variation in bulk and

format. The numerical value of 'D' for the year 1969 was available from the yearwise citation data collected separately

TABLE 1 The First Ten Periodicals of Sengupta's Ranking List of Microbiology with Corresponding Values of A, B, C, & D

Rank	Name of journal	No. of papers published during the year (A)	Total no of pages (B)	Total no. of words (C)	No. of citations noted for 1969 (D)
1	<i>J. Bact.</i> Vols. 97-100, 1969	833	5272	2699264	491
2	<i>Proc. Natn. Acad. Sci. USA</i> Vol. 62-64, 1969	597	4100	1435000	196
3	<i>Virology</i> Vols. 37-39, 1969	306	2356	883500	192
4	<i>Nature Lond.</i> Vols. 221-224, 1969	2297	5317	3349710	114
5	<i>J. Molec. Biol.</i> Vols. 39-46, 1969	385	4671	1050975	164
6	<i>J. Biol. Chem.</i> Vol. 244, 1969	902	6708	3823560	138
7	<i>Biochem. Biophys. Acta</i> Vols. 171-195, 1969	1878	14622	4066160	72
8	<i>J. Gen. Microbiol.</i> Vols. 55-59, 1969	232	2153	734173	139
9	<i>Biochem. biophys. Res. Commun.</i> Vols. 34-37, 1969	592	3922	686350	109
10	<i>Science, NY</i> Vols. 163-166, 1969	1209	6057	3694770	77

*This ranking order was based on total citations collected for the years 1968, 1969 and 1970

by Sengupta for each ranked periodicals of microbiology and has been shown in Table 1 as the actual value of D. Now since all the variables of A, C, and D are known, the numerical values of the parameters D/A , C/A , and D/C can be easily calculated. All this will help to analyse the number of citations in relation to size of journal and average length of the papers

published. We have evolved this method of analysis in order to eliminate the bias due to the bulk of research periodicals and unrelated to the scientific value of individual papers published in it that is inevitable in ranking lists prepared on the basis of numerical counting of citations of individual periodicals.

3 DISCUSSION

The first vertical column of Table 1 enumerates 10 ranked titles of microbiology. In the subsequent vertical columns we have shown the numerical values of A, B, C, and D in respect of these 10 periodicals along with their respective number of citations noted for 1969. Our main objective is to apply these three parameters separately on these titles to find out their relative importance and re-rank them according to actual scientific interest of a journal in relation to the total number of papers published (D/A), the compactness of the information content (C/A) and the scientific value of the paper in relation to compactness of presentation (D/A).

The value D/A is an index of the scientific value of the papers published in a journal, corrected for the bulk of material published in a year, which varies considerably from journal to journal. When titles in the uncorrected ranking list (Table 1) are re-ranked according to the value of D/A , the revised list puts the journals in order to their scientific value without bias due to bulk. Thus from Table 2 it will be seen that the proportion of papers of scientific value in microbiology, as judged by frequency of citations per paper published is highest for *Virology* (ranked 3rd in Table 1) followed by *J. gen. Microbiol.* and *J. Bact.* (ranked 8th and 10th in Table 1 respectively). But the margin between these three journals is very narrow. Thus if re-rank Sengupta's first 10 ranked journals in the field of microbiology the re-ranking order according to parameter D/A will be as shown in Table 2.

It is interesting to note that when guided by this parameter the first three positions go exclusively to microbiology journals. This conforms to expectation as each of these three journals is considered as one of the best medium of communications for the working microbiologists. The reason for '*Virology*' topping the list perhaps needs to be qualified. It may be the present predominant interest in molecular biology and virology being a discipline basic to present experimental work in molecular

biology. Similarly, the high positions of *J. Molec. Biol.* undoubtedly reflects the new directions of interest in present-day

TABLE 2. Re-ranked Order of the First Ten Journals in the Field of Microbiology According to Parameter D/A

Re-ranked order	Name of journal	No. of papers published during the year (A)	No. of citations noted for 1969 (B)	No. of citations per paper published (D/A)
1	<i>Virology</i>	306	192	0.627
2	<i>J. Gen. Microbiol.</i>	232	139	0.599
3	<i>J. Bact.</i>	833	491	0.589
4	<i>J. molec. Biol.</i>	385	164	0.426
5	<i>Proc. Natn. Acad. Sci. USA</i>	597	196	0.328
6	<i>Biochem. Biophys. Res. Commun.</i>	592	109	0.184
7	<i>J. Biol. Chem.</i>	902	138	0.153
8	<i>Science, NY</i>	1209	77	0.064
9	<i>Nature, Lond.</i>	2297	114	0.050
10	<i>Biochim. Biophys. Acta</i>	1878	72	0.038

biological research. When judged by this parameter, the information content of scientific value for the journal *Biochim. biophys. Acta* is the lowest: an indication perhaps of its undue bulk. However, it may be mentioned here that this parameter may be misleading when applied to multi-disciplinary general science journals like *Proc. Natn. Acad. Sci. USA*; *Nature. Lond.*; and *Science, NY* with broader scientific coverage since the formula which we have devised for this parameter has no built in correction for the variable proportion of papers of non-microbiological interest in such periodicals. Therefore, it follows that the scientific value of papers on microbiology published in these three multidisciplinary general science journals is even considerably greater than what has appeared in Table 2.

Compactness of information is inversely related to the value of C/A. Thus calculating the value of C/A from Table 1 it is seen that in compactness of information content *Biochem. Biophys. Res. Commun.* ranks highest. The aim and objective with which this journal was launched namely, publishing significant results with least possible delay, sufficiently justify its

TABLE 3. Re-ranked Order of First Ten Journals in the Field of Microbiology According to Parameter C/A

Re-ranked order	Name of journal	No of papers published during year (A)	Total no of words (C)	Average length of paper in words C/A
1	<i>Biochem Biophys Rvs. Commun</i>	592	686350	1159.4
2	<i>Nature, Lond.</i>	2297	3349710	1458.3
3	<i>Biochim. Biophys. Acta</i>	1878	4066160	2165.2
4	<i>Proc. Natn. Acad. Sci. USA</i>	597	1535000	2403.7
5	<i>J. Molec. Biol.</i>	385	1050975	2729.8
6	<i>Virology</i>	306	883500	2887.3
7	<i>Science, NY</i>	1209	4694770	3056.1
8	<i>J. Gen. Microbiol.</i>	232	734173	3164.5
9	<i>J. Bact.</i>	833	2699264	3240.4
10	<i>J. Biol. Chem.</i>	902	3823560	4239.0

occupying the highest position when judged by this parameter. Table 3 provides the re-ranked order of the first ten journals according to the parameter compactness of information content.

The third parameter D/C assesses a journal according to the scientific value of the papers published, with a weightage introduced for compactness of presentation. Among all the three parameters introduced by us, we believe this one will provide the best index of value of a scientific journal to research worker in the field of microbiology and therefore will also prove to be the best guide to selection of journals for subscription. This parameter has been conveniently obtained by simultaneous application of both criteria proportion of scientifically valuable papers (D/A) and compactness of information content (C/A) i.e. $D/A \div C/A = D/C$. The re-ranking order of the first 10 periodicals of Table 1 on the basis of the parameter D/C has been shown in Table 4.

From Table 4 it will be seen that when parameter D/C is applied *Virology* again ranks highest followed by *J. Gen. Microbiol.* and *J. Bact.*, three most prestigious conventional research periodicals in the field of microbiology. Papers published in the first 10 journals reflect the major directions and trends of microbiological research. It is therefore recommended that all working microbiologists at least should scan these

TABLE 4. Re-ranked Order of the First Ten Journals in the Field of Microbiology According to Parameter D/C

Re-ranked order	Name of journal	C/A (Average length of paper in words)	D/A (No. of citations per page published)	$\frac{D}{C} \times 10^{-4}$ (No. of citation in relation to overall size of volumes published during the year)
1	<i>Virology</i>	2887.3	0.627	2.2
2	<i>J. Gen. Microbiol.</i>	3164.5	0.599	1.9
3	<i>J. Bact.</i>	3240.4	0.589	1.8
4	<i>Biochem. Biophys. Res. Commun.</i>	1159.4	0.184	1.6
5	<i>J. molec. Biol.</i>	2729.8	0.426	1.6
6	<i>Proc. Natn. Acad. Sci. USA</i>	2403.7	0.328	1.4
7	<i>J. Biol. Chem</i>	4239.0	0.153	0.4
8	<i>Nature, Lond.</i>	1458.3	0.050	0.3
9	<i>Biochim. Biophys. Acta</i>	2165.2	0.038	0.2
10	<i>Science, NY</i>	3056.1	0.064	0.2

*For value of A, B, and C see Table 1.

journals in order to keep themselves abreast of the current trends of microbiological research for these journals are considered to be the main international media of microbiological communications and should reflect the impact of microbiological literature on the progress of microbiological knowledge more accurately and purposefully than any other journals on the subject. The list, should also serve as an authentic tool to help the librarians and information scientists to select journals for subscription and also for documentation work respectively. These journals will ensure them maximum utilisation of their library budget for the benefit of their clientele and also for preparing documentation list for circulation of nascent microbiological research results to the working microbiologists and also for storing them in proper order and format for future use.

It is needless to point out that this librametric analysis is a case study only for the first 10 ranked journals in the field of microbiology. The same procedure may be applied to other ranked periodicals of microbiology and a complete re-ranked titles of journals in the field can be obtained conveniently. The

methodology described in this communication is for general usage and may be useful to re-rank periodicals of other disciplines as well to correct the bulk of materials published in a year and also to enable listing of titles in order of scientific value of the papers published, with a weightage introduced for compactness of presentation. So, among these three parameters priority in acquisition may be given to the parameter D/C as explained earlier in the text.

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SECTION 6

REFERENCE SERVICE

6.1 Dialectics of Reference Services and User Education

GIRJA KUMAR

Obsolescence in Ranganathan's writings on reference service Dialectical relationship between reference service and user education Relation between theory and practice. Element of dialectics in Ranganathan His definition of reference service. High proportion of directional reference service Informational vs instructional functions of reference service Primacy of user education over reference service User education as a continuum User education viewed as a methodological discipline Reference process as a constituent of decision-making Marketing of information services Information behaviour as a subject of the future. Problem solving as a cognitive process Information needs and information satisfaction viewed in terms of input-process-output model.

1 DIALECTICAL PERCEPTION

That the contributions of Dr S.R. Ranganathan are seminal nature in many fields including reference service is not a matter for any disputation. His work is however, to be gauged in a correct historical perspective. He was not a student of dialectics in formal sense of the term, but dialectics are implicit in his thinking process. The intellectual thought is now more than ever before in the process of constant flux. It was no less true of Ranganathan's thought process.

What he fiercely defended today, he had no hesitation in demolishing tomorrow. He must have known that apart from seminal portion of his work (Five Laws are an instance of the kind), considerable amount of his work was love's labour lost.

It was historically bound and thus relevant within the given space and time and societal limits

There is thus a great need to separate the chaff from the grain in his writings, including his socially relevant work in reference service. In other words, the element of obsolescence may be as high as in respect of many other creative thinkers. Not only the process of obsolescence takes place in one's life time through further development of personal creative thought, but also it tends to be overtaken by others following in the train.

While Newton overtook Galileo and was overwhelmed by path breaking discoveries of Einstein, the historical significance of earlier scientists can by no means be reduced in the historical process. It is our contention that the work of Ranganathan has to be viewed dialectically for a correct perception. His work in the field of reference service may have comprehended basic concepts of user education by implication only.

11 Reference Service vs User Education

That qualitatively user education is a different concept from reference service is as crystal as clear. At the same time it cannot be denied that reference service and user education are historically bound because both subserve the same objective.

The relationship is by no means intellectually stimulating and indeed it may be of interest only to those fond of delving into the genealogy of librarianship. That there is a large line of demarcation between the two can be evident from the concepts now constituting the glossary of user education:

Bibliographic instruction
Individualized instruction
Learning process
Learning skills
Searching strategies
Learning strategies
Learning packages

Information behaviour
Information needs
Information seeking
Information utilization
Information evaluation
User status action

There is need at this stage to trace the dialectical relationship between reference service and user education as the backdrop for a futuristic design rooted in the new and developing intellectual tradition. Significantly enough, the roots of the same are to be traced to concepts drawn from other disciplines. Library science is now truly growing into an inter-disciplinary field.

12 Theory and Practice

While Ranganathan was by no means a formal student of dialectics, he made effective use of the same in his writings. Ranganathan's thought processes are very similar to that of Mao Zedong, who laid so much emphasis on class inter-relations between theory and practice.

In his well-quoted essay entitled "On Practice : On the relation between knowledge and practice, between knowing and doing" (1937), he has stated the obvious but much-forgotten truth that "rational knowledge depends upon perceptual knowledge and perceptual knowledge remains to be developed into rational knowledge this is the dialectical—materialist theory of knowledge."¹ He even went to the extent of approvingly quoting Lenin about "*Practice (being) higher than theoretical*, for it has not only the dignity as universality, but also of immediate actuality", for "the truth of any knowledge or theory is determined not by subject feelings but by objective results in social practice."²

It is not necessary to be a student of Marxism to recognize the truth of the above statements. Ranganathan was farthest from being the student of orthodox Marxism, but he was a firm believer in "social practice" as the basis of testing the theoretical formulations. His theory of reference service was based upon actual practice of reference service. Not only practice reinforced the theory, dialectical process also took place in the reverse direction, whereby theory reinforced the practice in an equal measure.

13 Contradictions

To carry the argument further, reference must be made to another essay of Mao Zedong entitled "On contradiction" 1937, which he published exactly one month after he published his essay "On practice" and wherein he stated that contradiction is the essence of dialectics. The law of contradiction in things, or the law of the unity of opposites seems to be the basic law of dialectics. It is equally true of Ranganathan because through constant social practice and through the performance of actual reference service in his place of work, he was able to enunciate the theory of reference service with universal implications.

The process of development was a constant and distinctive feature of his work style and in the process of developing theory through social practice, he gave the impression of contradicting

himself. In fact, he was contradicting himself, because as in dialectics, he recognized by clear implication that "in the process of development of each thing a movement of opposites exists from beginning to end."³

To sum up, Ranganathan recognized the primacy of dialectics. He established the unity of opposites in his writings by combining theory with practice. He accepted the dialectics as a developmental process. He also gave recognition to the developmental process both in its inter-connections and each of the aspects.

Not only the theory of reference service evolved in the very process of practice throughout his professional career, but it is related to the whole edifice of library science and its various departments, thus establishing the truth of dialectical relationship between the whole and part.

It has, however, to be recognized that his writings on reference service have a larger element of practice than theory, because reference service was his passion in his earlier years and was somewhat showed down in his subsequent writings. It is especially established by the fact that he was not cognizant of the growing literature on library instruction, teaching library, user education and similar concepts. At least, these ideas do not seem to be reflected in his writings.

2 RANGANATHAN ON REFERENCE SERVICE

His basic work on reference service was Ranganathan S.R. and Sundaram, C., *Reference Service and Bibliography*.⁴ It was subsequently revised by him and published as Ranganathan, S.R., *Reference service*.⁴ *The Five Laws of Library Science*² is a more substantive work enunciating basic ideas about reference services during the course of discussion about diverse subjects. In *Five laws*, Ranganathan approvingly quotes President Harper (1894) who not only anticipated user education in its broad framework, but also had the farsightedness to advocate the creation of academic positions in bibliographical science: "Some of us will see the day when in every grand division of the University there will be professors of bibliography and methodology whose function will be to teach men, how to use books". He was further convinced that "the equipment of the library will never be finished until it will have upon itself men and women whose sole work shall be, not

the cataloguing of books, but the giving of instruction concerning their use."⁵

Obviously Dr Ranganathan had taken a passing fancy to the statement, because he hardly pursued the thesis in his subsequent writings. He essentially confined his attention to elaborating the concept of reference service, because this very concept was revolutionary enough for his times. He was thus hardly aware of the potentiality of user education.

21 Defining Reference Service

His definition of reference service revolves around the establishing of effective contact between the reader and the book through the intermediary of reference librarian. He had defined reference service as "the process of establishing contact between reader and book by personal service."⁶ It is thus to be noted that the role of activist has been assigned to reference librarian with the place of user as a passive agent. He had tried to elaborate upon reference service by delineating four categories of reference service : (1) initiation, (2) directional instruction (general help to readers), (3) ready-reference service and (4) long-range service.⁷

His basic contribution to reference service lies in delineating a line of demarcation between ready and long-range reference service. Basic difference between the two types of services lie in respect of (1) the time involved, (2) the materials used and (3) the nature of the information sought. These ideas must have seemed revolutionary for those times in the Indian context, but their relevance has somewhat dimmed, because the solutions found by Dr Ranganathan had strictly local relevance, both in terms and space.

It shall be also a useful exercise to find out universal elements in his ideas on user education. To sum up, not only qualitative jumps have taken place by the innovative concept of user education, reference service as a sub-discipline of library science has come up of age both in respect of its literature and status.

22 Directional Reference Service

His work on reference service was essentially based upon his experiences at the Madras University Library in the thirties and forties. The University was essentially an undergraduate institution and evidently most of the reference queries were of directional nature. The level of the query, the back-

ground of the user, the context in which the query was asked and the sophistication of the reference librarian (both in respect of his subject specialization and managerial capabilities) are equally important. What the user is actually looking for at his subliminal best is knowledge and not information alone. Such matters do not find reflection in the writings of Dr Ranganathan in reference service. Moreover, user studies had not reached the level of sophistication during his times.

In a revealing user study conducted in the United States, reference questions were divided into four categories : (1) directional, (2) instructional (user education), (3) ready reference and (4) long-range reference (extended reference) The survey indicated that 44.1 per cent questions were directional, 18 per cent 32 per cent ready reference and 5.9 per cent long-range reference queries.⁹ The percentage of directional queries continues to be very high. It was assumed in the study that about 80 per cent of reference queries could be answered by para-professionals or technicians in the library. In fact, there is a debate taking place currently about the value of answering directional queries as constituting at all the world of reference service. There is need to have a line of demarcation between directional and reference services on the one hand and the user education on the other.

23 Reference Service as Spoonfeeding

Ranganathan attached considerable importance to reference service in his earlier writings. Indeed he had termed reference service as the essence of librarianship. He was greatly impressed by public library movement in Western countries, especially because reference service was an essential feature of the same.

In essence, public library movement was a democratic institution *par excellence*, because it provided an ideal framework for communication between the user, information and the librarian who happens to be the intermediary between the other two. It is in pursuit of this ideal that Dr Ranganathan was greatly interested in adult education, recognizing its primary value in a developing society with low rate of literacy. His major contribution to reference service lies in the distinction he makes between short-term and long-range reference service.

The initial enthusiasm displayed by him in the subject was not sustained in his subsequent writings. In fact, the decline in his interest is in inverse proportion to the rising

graph of interest in pursuing user education on world-wide basis. User education employing the nomenclature of Bibliographic Instruction vogue in the United States about the same time.

24 Informational vs Instructional Function

The block in Ranganathan's conceptual framework about reference service resulted from equating reference service with personal service, in which the user became added to personalized service amounting to dependence of the order of spoon-feeding. The relation between the giver and taker was not of an equal level, but smacked of colonial relationship. Reference service threatened to confine the user to a permanent colonial framework.

What was a progressive step was, dialectically speaking, turning into a retrogressive measure, thus establishing thesis of contradictions within the contradiction invalidating tomorrow that was valid today. There is no direct evidence to establish the thesis, but the impression is inescapable by reading between the lines that Ranganathan was unable to resolve the contradiction in his mind about new lines of thinking about reference service.

This happens because most thinkers on reference service tend to overlook the simple historical fact that reference consists of two major functions, namely, information and instruction. Not only both are like the two sides of the coin, thus essential concomitant to each other, but, as in a true dialectical situation, instruction is to be placed on higher pedestal in the evolutionary order of development of thought on reference service.

The dialectical relationship works in the following manner : "They function at cross purposes at each other. Reference is subjective because of its stress in personalized service. Instruction has objective connotations about it because it encourages the user to independence study. His direct access to sources dispenses with the intermediary after he has educated himself in the use of the library. There is, thus, a fundamental contradiction in reference service and user education."¹⁰

The primacy of user education over informational reference service is thus an inevitable historical process. It is in line with developments in the field of knowledge including the discipline of education. Reference service is an inter-disciplinary field in which the knowledge of library/information science, educational policy and developments in several or single discipline of know-

ledge are to be aligned to achieve the best results. As the process of self-learning is of higher order than imparting of learning through traditional teaching, similar is the case between information² reference service and user education. In fact, a parallel chart needs to be drawn up to establish the identity of interest between learning and user education. The break throughs in user education are potentially of the highest order parallel to the developments in cognitive theory.

3 USER EDUCATION AS CONTINUUM

Informational reference service and user education are to be viewed as a continuum to place their relationship in a proper perspective. Ideally speaking, the statement that "Bibliographic instruction at its most elemental level is simply one-on-one reference assistance,"¹¹ expressed the symbiotic relationship at its best. Such a sentiment has been formalized in the following statement of ACRL Bibliographic Instruction Section, "Think Tank Recommendations": "Such instruction is not designed—nor it should be designed to make the student user independent of the reference department. We need not make every student a reference librarian, though we can certainly make them knowledgeable."¹²

Unfortunately, very little fundamental thinking has been done about the symbiosis between the important subjects of information service and user education. The falsity in the foregoing statements is obvious. While reference service is "spoon-feeding" at its best, the basic object of user education is to make the user independent of the intermediary (the reference librarian) and enable him to have access to information independently. Not only the access to information is to be facilitated, but the user is to be encouraged through the learning process to be enabled to self-evaluate information. The very fact that an authoritative statement issued on behalf of the Association of College and Research Libraries (ACRL) underlines continuing antiquated thinking about professional matters at the highest level, is astonishing.

31 *User Education as Methodological Discipline*

User education in future must be viewed as a methodological discipline concerned with a "purposeful manipulation of content," so that the right type of information can be assessed

automatically by the user. In other words, "the basic task of information and library science is to educate the users in appropriate methodology, so that they can be the masters of independent study."¹³ While Lancaster's Paperless Society may seem unreal, user education as a learning process and as a branch of independent study is within the compass of possibilities. The hiatus has come to pass because, conceptually speaking, no advance has taken place in reference theory for all practical purposes since the times of Dr S R. Ranganathan. As we have stated earlier, Ranganathan exhausted practically all his ammunition in the earlier phase of his professional career. This we shall establish in the argument in the following paragraphs.

It has been stated that user education should be based "on knowledge of the social and intellectual characteristics of the academic disciplines which give rise to their different patterns of scholarly, bibliographic, and encyclopedic literature."¹⁴ True enough. It is equally true of reference theory, but in equal practice it is not so. In spite of the big talk of reference librarians having moved from being "conservators, collectors, custodians, and caretakers to counselors, mediators, facilitators, and educators,"¹⁵ it has not come to pass an actual practice.

4 REFERENCE THEORY

Qualitative jumps take place in knowledge by ideally combining theory with practice. As Mao Zedong would have put in his characteristic language: "Theory grows out of practice and practice feeds on theory, as if out the barrel of a gun."

Reference service is both an art and science. There is thus an ideal combination of theory and practice. The abundance of literature of reference service is not reflective of its actual merit. Most of the writings have to do with the art of reference service. It is now high time for paying attention to the science of reference service (reference theory) by striking a balance between theory and practice, so that qualitative jumps in knowledge are possible in the true dialectical situation.

Reference service is due for a systems approach. There is certain comprehension of the dimensions of the problem in recent writings. It has begun to be recognized that there has to be an understanding of the reference process and furthermore, "with the aid of a logical approach for satisfying information

requests the librarian can apply certain basic principles to locating an answer, regardless of the nature of the query asked for or the library in which it is answered,"¹⁶ meaning thereby that methodological questions have to be uppermost in our thinking about reference service

Reference service has thus been defined as the process of satisfying specific, recurrent information. It logically leads to the assumption that reference process has to be viewed as a constituent of decision-making theory. Decision-making theory is a vast subject and reference theory has touched no more than the tip of the iceberg. The future thrust has to be in the direction of systems approach and by building a model of reference theory. Reference theory has to become a constituent of the mainstream of management science, with special attention being paid to decision-making theory. Quantitative jumps in reference theory are no doubt conceivable in changed situation

5 MARKETING OF INFORMATION SERVICES

Marketing of information services may seem anathema to librarians fed on "tea and sympathy" of free and universal library service. It is a fact of contemporary life. While talking of decision-making, it is possible to draw striking parallels between decision-making in management science and library and information science. Its relevance to reference service and user education is beyond question. The whole situation may be viewed in a proper perspective by drawing analogies between marketing in management science and library and information science.

The principal component of marketing is a responsive attitude to the needs of the organization's customers. Similarly the main objective of the library as a bureaucratic organization is, to employ the terminology of Max Weber, to maximize information of its users not only meeting with, but also anticipating their information needs. The concomitant of marketing are "product development, pricing, distribution, and communication; and in the more progressive firms, continuous attention to the changing needs of customers and the development of new products, with product modifications and services to meet those needs."¹⁷ In the context, new horizons are bound to open for reference service as well as for user education, because those are

to be viewed in the context, not confined to their narrow framework.

To follow the analogy to its logical end, while the first step in marketing is product development, it has to be collection development in libraries to make reference service most effective. Recognizing that marketing is rarely homogenous and information needs of users varying, thumb-of-the-rule cannot prevail in providing reference service and user education to myriad user groups that constitute the wonderland of libraries.

51 Information Behaviour

The next logical step is the customer behaviour analysis through marketing surveys and studies. Indeed information behaviour has come to be recognized as the most fascinating field study in the future. User studies seem thus to be the most productive field of study for modulated information behaviour to maximize information satisfaction.

It is important to recognize decision-making process behind information strategies. There is however, a sharp break between decision-making in marketing of products and provision of reference service. While information strategies in marketing are intended to maximize profit independent of larger societal good, information strategies in reference service and user education are intended to maximize genuine information satisfaction.

As there is a need for integrated market planning for overall coordination and better performance, similarly reference service and user education have to be placed in the larger context. It has been found that it was necessary to obtain continuous marketing feedback by collecting information about changes in the environment. Similarly, it has to be recognized that information needs and user groups are not a constant factor like the pole Star and those are subject to mercurial changes keeping with the constantly changing societal environment of libraries and information centres. Such institutions as are not sensitive and responsive to the changing environment get into the state of crises times without number. Information services and user education are ought to be the most sensitive barometer to the changing environment.

Marketing of library and information services is indeed a Pandora's Box that awaits its fuller exploitation. Ranganathan was vaguely sensitive to the marketing of information and indeed made a few passing reference to the subject, but that is

all that can be said to him share.

52 Problem Solving

To recapitulate the main thread of argument, decision-making implies problem solving. While profit-making organizations employ marketing techniques, user education seems to be the most effective agency for problem solving for information use. Problem solving involves identification of methods for learning appropriate skills and strategies for solving problems. There is enough literature on problem solving to justify designing of a conceptual framework for problem solving. The components of such a model small provide for an "appropriate and well-organized knowledge structures, adequate representation of problems, automatic information processing, and efficient pattern—recognition systems that can trigger appropriate problem-solving procedures."¹⁸ Such a strategy of problem solving makes user education as a constituent of mainstream of cognitive educational theories.

As the foremost objective of educational institutions is to impart knowledge and to teach cognitive skills (for eventual independent study and by transforming teaching into learning process), so are the objectives of user education. Library and information science in general and user education in particular are *ipso facto* constituents of a larger whole and, to an extent, dependent factors for developments outside their strictly narrow framework.

The effectiveness of cognition as a learning process in user education is assured when the user: (1) cognitively processes instructional input (as an important determinant of learning), and (2) these institutional inputs are integrated into the knowledge structure of the user,¹⁹ so that he can be the master of independent study insofar as access to information in the library is concerned. It is however to be noted that cognitive processes shall not only work in respect of access to information in libraries, but the same processes shall take place in educational practices simultaneously.

53 Cognitive Processes

Step-by-step approach in this paper has logically led from decision-making to marketing and then to problem solving and finally to cognition. The transition has dialectical quality about it. Gradually quantity as in a dialectual process is transformed

into quality, so that a perspective gradually gets transformed. The transition from reference service to user education is of the same order as the change of quantity into quality as in dialectics. All this is like the tip of iceberg. Our comprehension of the fundamentals of information-seeking behaviour, information needs, information-gathering habits and information satisfaction is rather of primitive order. Lot of gaps in information available at present remain to be filled up before the learning process is imbibed through user education.

Information-seeking behaviour is indicative of uncertainty. It is concerned with how and from where user gets his information. It is thus essential to find types, kinds, levels and amount of information. Pertinence of information may not be the answer to the user's needs. In other words, pertinent information may not be relevant to the needs of the user. Most of the information systems in existence are presently not in a position to bring out pertinent information. Their capability to bring out relevant information is rather limited. There is hope in this direction by introducing profile designing on large scale by training in self-learning for users. It shall be required to match user's knowledge structure with structure pattern in subject representation. To achieve this is a very tall order.

6 INFORMATION NEEDS

Logically we arrive at the stage of defining information needs. While information is viewed as a stimulus that reduces uncertainty, need is the recognition of uncertainty as perceived by the individual. In the Marshallian Economics of perfect competition, supply and demand match beautifully and thus the resultant price of a commodity is predictable. Similarly in the ideal world of users of information, the perception of the need is without any doubt. It is not so in the real world of hard reality.

It is well-known that the articulation of information is not necessary always logical. It is largely determined by the environment and the individual concerned. The articulation of information need not be expressive. Similarly, as it has been argued earlier, the perception of the need may not necessarily result in discovery of relevant information. This ill-matching can take place at several levels. Even the best of the ordering system may yield what is commonly known by scientists as "garbage in and garbage out."

No proper methodology has been so far able to answer these questions. It is the task of user education through the mechanism of learning process to reduce the gap. The need is to stimulate modulated information needs in the minds of users. It means at its best to provide user education at the highest plane to enable him to do self-profiling and gradually build his personal information system, so that applying well-designed methodology, the user can reduce the element of uncertainty in his information need to the bare minimum. Information gathering ("... those activities in which stimuli are accepted and held in stored to be recalled on demand"), along with defining information needs become important activities.

In ultimate analysis, highest objective of information-seeking behaviour is information satisfaction to be obtained through modulated information needs. To sum up, in terms of input-process-output model, the basic components of the systems are: (a) problem (information need), (b) problem-solving process (user education) and (c) solution (information satisfaction).

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6.2 Ranganathan and the Evolution of Reference Service in India

N. R. NATHAN

This paper tries to explain that Dr Ranganathan was the first person in India and one of the few in the world who systematically tried to make reference service a very important facet of library service. His philosophy was to provide the much needed help and guide to library clientele by offering an understanding personalised service. He approached the problems with all seriousness and never wasted time of the user. Dr Ranganathan wanted library professionals to value the time of the user and to provide a prompt and satisfactory service. Reference service was a very important facet in his scheme of things to make a casual user into a regular user and thus to open up the treasure of library for the benefit of mankind. He was the path-finder in giving shape and size to reference service in India. By his tireless effort he succeeded in building up a team of dedicated band of librarians who are ever willing to provide the service

The reference service at the nascent stage according to James S. Wyer and quoted by Dr Ranganathan is to 'provide the books and keep out of the way of readers as much as possible' and 'make books available easily and save time and labour of library staff for other work.' This attitude has been changing slowly and steadily, but the appearance of Ranganathan in the Indian horizon gave an impetus for the trend as well as a new and fresh outlook for the service.

Reference service is an essential facet of a service library. It helps to maximise the utilisation of the resources of the library. The human factor is an important one in this area and it can hardly be disputed. A librarian with a great deal of spirit and devotion to service will be able to help and guide the user. According to Ranganathan reference service is the process of establishing contact between a reader and his documents in a personal way. He explains 'his document' as that all documents whether used at the moment or to be used later on, or likely to be of use to him afterwards.

We render reference service directly and personally to rea-

ders who require help for specific information for study/research. James I Wyar has very aptly defined that reference service as 'sympathetic and informed personal aid in interpreting library collection for study and research'.

Reference service generally consists of location of documents, compilation of bibliographies, helping readers in choosing documents on their chosen fields and to arrange inter library loan for documents not available in the library from other libraries. Nowadays the inter-library loan is proving to be an important aspect in the service.

The main problem in reference work is the necessity to understand exactly what the clientele demand. Hence it is always better to guide the reader to make specific question/s as far as possible so that his time can be saved as well as he can be served better and quicker. A reference query recording system has been evolved to do this.

How far should librarian help a reader about his bibliographical reference needs? It may not be easy to decide on the assistance a library can offer to its user. Modern libraries have based their reference service on the relationship between the reading materials and users. But they are not always able to provide complete reference service to research requests because of deficiency in their own holding. Here the inter-library loan arrangements play a major part.

The growth of reference service in India was very much influenced, for that matter every facet of library science by Dr Ranganathan's entrance into the library profession. Nobody will deny the fact that upto the time of Dr Ranganathan's entrance, real reference service worth its name was not available in India. He not only changed the entire concept of library service as was available in the 1930s but also laid a firm foundation for its growth into a full-fledged science. By the end of the Second World War, he perceived the new trend in reference service. According to him emphasis shifted from whole books embodying macro thoughts to articles in periodicals and journals containing nascent micro-thoughts. The highlight of this shift is that the reference service of the intensive kind emerged. The new kind of reference service personnel came to be denoted as information scientists.

One of the important point to be noted regarding reference staff, according to Ranganathan is that they must resist the 'fascination of administrative routine and prestige.' We find

that a clear cut idea of how a reference service must be planned and made to function is given by him. As stated earlier it seems that he was the first person in India to formulate the fundamental principles of library reference service.

Dr G. Bhattacharyya very aptly writes that 'Ranganathan's taking up the library profession in 1924 marks the beginning of India's entry as a contributor to library science.' To emphasise the attitude a library staff must have in serving the clientele, Ranganathan quotes from *Ramayana* some words of Sita to Rama, "I do not instruct; I only remind you out of my love and regard for you." This is the attitude he wants the reference service staff to cultivate towards his clientele.

According to A.K. Mukherjee 'whether there is a specified reference service in a library or not, the modern progressive theory of reference work assumes that every library desires to give the fullest possible attention to demands made on its reference sources.' In India the growth and development of conventional types of reference tools have a direct bearing on the prolific writing of Dr Ranganathan. His writing on all facets of library science gave stimulus for further progress and growth in reference literature. Though pioneering work on the system of reference service has been done by Dr Ranganathan, the Indian publishers/librarians have as yet to make a matching contribution in the field.

Dr Ranganathan's outlook was that a library is a multipurpose social institution with a variety of jobs. He firmly believed that it should assemble, organise, preserve, offer and guide the needy to the knowledge hidden in the library. He was of the view that 'contact between the right reader and the right book at the right time and in the right personal way is the effective method by which people can be made regular users of library service. He named this as reference service. His philosophy was that a contact between reader and book can be profitably established with an understanding personal service provided by the reference librarian.

The Five Law of library service propounded in 1931 by Ranganathan truly reflects in a nutshell his approach to library service and reference service in particular. They also point out how to approach and proceed in matters regarding reference service. This shows us how he always thought about the value of time and how he wanted to save the time of the user. His zeal was such that in 1930 reference service was first started at

the Madras University Library with a group of dedicated youngmen trained by him in the value of reference book.

The horizon of knowledge has been expanding at a fast pace, as also the demands on definitive aspects of disciplines. The conceptions of reference sources or tools or of reference retrieval systems or services have evolved from these emerging situations.

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6.3 Reference Service—A Humanistic Approach

NAVJOT KAUR and SEWA SINGH

Reference service is aimed at helping the user in a humanly manner for his greater good. Ranganathan's contribution to reference service is that he regarded classification, particularly analytico-synthetic classification, as its integral part. This approach helps both the reference librarian and the users on the one hand and the classifiers and cataloguers on the other. The reference librarian can reveal the new pattern of knowledge to his colleagues so that they can improve the classification work along the lines indicated by the needs of reference service.

During the past hundred years, as concepts and theories of reference service have been discussed, various standards have been developed for various types of libraries; public libraries, school libraries, special libraries, college and university libraries—all of these standards have alluded to reference services and reference resources within the specific type of library. However, one of the problems has been the lack of a written theory or philosophy of reference work. The tendency has been to write procedures rather than the rationale and substantive principles involved.

The guidelines issued in January 1976 by the Standards Committees Reference and Adult Services Division of ALA are a long over due attempt to provide detailed guidelines to reference and information service, irrespective of the type of library. They should not be considered fixed, but as the basis for individual libraries and librarians to develop, expand and emphasize those elements.

A modern library has been variously described as "The heart of the University", "the intellectual arena of the teachers and the taught", "the workshop of the scholars", etc. The scholar is a regular user of the resources of the library and is very well described by Emerson as the 'Man Thinking'. Although the scholar, as a regular user, knows much about the resources of his interest arranged in the library, he may at times, stumble down in the artificiality of the library tools such as classification

system, cataloguing system, etc. or even that of the book itself. What he requires immediately at such occasions is reference service which now has become an integral component of a well organised library system rich in resources and heavily used by the scholars.

We, in India, owe the emergence and development of the concept of modern reference service to the illustrious father of Indian library movement Dr S.R. Ranganathan. In almost all his works he had discussed the reference process and the ultimate purpose. His first book *Five Laws of Library Science*¹ is based on the principle "Books for All", and "Service for All" and these form the basis of effective reference service "as the supreme and ultimate function of a library."² Thus he firmly believed that effective reference service provided to the scholars should be the end of all librarianship. He declared that:

Reference service is the primary motive and the culmination of all library practices. Its varieties, the what, why and how of them, the preparation for them, the varieties of bibliographical and reference materials, and the organisation of the time of the staff in relation to them—all these are drawn out of the Five Laws³. . . .

His seminal book *Five Laws of Library Science* thus becomes the fountain head of reference service. Reference service, therefore, is the very essence of librarianship and "the ultimate human manifestation of five laws."⁴

He views reference service from humanistic point of view where in he emphasizes upon the qualities of reference librarian which help in the individual progress of the scholar. The insistence of modern humanism on "the progress of the individual from helpless infancy to self governing maturity" indicates the priority given to individual over the society.⁵ The First Law Books are for use—helps in evaluating books and other materials on the basis of "distinctively human interests" and working for the all round development of the individual.

He made reference service humanistic in practice because it is "the process of establishing contact between a reader and his documents in a personal way"⁶ and thus helping scholars. He further says that:

There must be an intimate communion between librarian

and reader. From the first moment of the reader asking for help to the last moment of his getting all his documents, the librarian will have to be personally administering to the needs of the reader. Therefore, reference service is essentially personal service.⁷

He is talking of humanistic values emerging from the personal interaction between reference librarian and the scholar thus leading him to the path of ultimate joy.

He noted that "reference service is the prepotent achievement of modern humanism in Library Services,"⁸ because reference service is aimed at helping the user in a humanly manner for his greater good and in securing greater happiness through obtaining desired information. And this is precisely the call of humanism upon the library profession in general, and reference service in particular.

Since he had deep faith in the Vedic traditions of life and conduct he occasionally viewed the call of librarianship and the practice of reference service from the traditional Hindu values. He coaxed the reference librarian by quoting extensively from an array of Hindu scriptures to lead the scholar from the "vital plane" to "mental plane" to "spiritual plane" for his all round development. Ranganathan believed that this leads to "the attainment of the happiness... of knowing and creative thinking."⁹ It is the ultimate end of this "perennial self-enrichment of mental heritage" which is based on the personal level, a state of "intimate, sympathetic atonement with everybody else in the universe."¹⁰

This leads to the individual progress of the scholar and ultimately to the maximum joy and satisfaction in the possession of knowledge.

Ranganathan also brought forth a unique quality which the reference librarian must possess, that is the "flair", because according to him intellectual training alone is not sufficient. He writes:

Flair is an intensely personal quality. It has to grow in an individual. Some may be born with it. It transcends analysis with the intellect. It transcends mechanisation. It transcends even standardised thinking. The personal help of a reference librarian, with an abundance of flair, is often

necessary to make the library achieve its complex of purposes, social and individual.¹¹

To achieve lasting results, observes Ranganathan, "the right way according to humanism is to give weight to personal help to readers in libraries"¹² so that they could derive maximum satisfaction. For the ultimate aim of reference service is the satisfaction and happiness of users. He writes further that:

The joy of the reference librarian should be derived not only from the consciousness that he himself had practically done everything, but from the sight of the dawn of joy in the face of the reader.¹³

The personal reference service which Ranganathan advocated quite vehemently becomes, as a result of the call of the Five Laws of Library Science—intensive reference service. This is nothing but long-range reference service turned into documentation service which he defines as "pinpointed, exhaustive and expeditious service of nascent micro-thought to specialists."¹⁴ This kind of documentation service is virtually what is now known to us as Selective Dissemination of Information (SDI). Documentation can thus conveniently be called on precursor of the modern SDI service.

It can be said unhesitatingly that reference service which in Indian libraries got no place before Ranganathan, and later was considered less important than administration, classification, cataloguing, has now developed into information service due to the untiring efforts of the Indian beacon light Ranganathan.

Another significant aspect of Ranganathan's contribution to reference service is that he regarded classification, particularly analytico-synthetic classification, as its integral part. It is for the first time that a librarian applied principles of analytico-synthetic classification to reference service making it a primary aid to the reference librarian in his basic job of assisting his users in the use of library materials.

An analytico-synthetic classification system will enable the reference librarian to provide the user with information precisely answering his requirements at the moment. Such a classification system categorises the whole body of knowledge. It analyses the fundamental concepts and enables to identify them distinctly, thus establishing meaningful relationships among

themselves. The reference librarian can conveniently facet analyse and synthesise the question of the scholar and can find out the relevant documents from the classified catalogue thus connecting users and the wanted information in a direct personal way.

Ranganathan observes that the reference librarian "applies the classification scheme in the ultimate stage of library service which is effective contact between the right reader and the right unit of thought in a personal way".¹⁵ And to achieve this pleasant task he must "facet analyse" the question asked by the subject specialist. By this process the reference librarian can fruitfully narrow down the range of his search and can hit upon the nascent information required. Ranganathan informs that:

The orderly display of specific subjects provided by an analytico-synthetic classification on coupled with chain procedure gives to a reader the same kind of help as an orderly display of articles in a shop does to a customer.¹⁶

It thus presents a panoramic view of the universe of subjects. The usefulness and application of classification to reference service is further elaborated by E.J. Coates thus:

The surprising and satisfactory thing about subject classificatory structure is that the general pattern for most subject is more or less the same . . . It is not necessary to learn the classification pattern for each subject anew. Once the general categories are understood in their application to a few subjects the pattern for other subjects reveal themselves almost instinctively.¹⁷

Forbett¹⁸ also corroborates such views of Ranganathan. Such a study enables the reference librarian not only to grasp the developing patterns of knowledge but also to understand the new inter-relationships among the subjects.

It is now entirely a new approach to practise reference service with the systematic help of analytico synthetic classification system. This approach helps both the reference librarian and the users on the one hand, and the classifiers and cataloguers on the other. The reference librarian can reveal the new patterns of knowledge to his colleagues working behind the

screen so that they can improve classification work along the lines indicated by the needs of reference service.

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6.4 Reference Service: Its Basis and Development in Ranganathan's School

G.S. RAGHAVENDRA RAO

The *Summum Bonum* of the Library Service is *Reference Service*. Dr Ranganathan traced the developments in the changing role of a library from a keeper, preserver, collection for reference in closed access to open access and lending of books to bonafide user. The latter two aspects were a revolution parallel to what we call on-line system, information at the user's door-step in a push button distance etc.

In this context, Ranganathan's main contribution is the realisation that personalised reference service is the best seller of library profession's ethos. The Townsend's saying "Take my hand; For I have passed this way, And know the truth" was the basis for Ranganathan's contributions.¹ If we match this philosophy to the modern philosophy of on-line information system of user friendliness, user education, interactive searching, data base organisation, we almost re-enact Ranganathan's theory and practice of collection building, collection organization, maintenance, and interactive search strategy and feedback. Ranganathan's world was simpler. It emphasised the service on the floor of a library. But today's information system, due to computer and telecommunication facilities, aims to contribute to a global clientele.

Ranganathan prepared a professional background and a thinking for the current world of information dissemination. His philosophy embedded in his five laws and its application to human context "knowledge for development" is as relevant today as it was 60 years ago when enunciated and in our opinion, it is the much needed force to rejuvenate our library atmosphere in academic and public libraries. This is illustrated with a case study done on the floor of a library.

1 INTRODUCTION

Dr Ranganathan's contribution to Reference Service can be considered innovative in several ways:

He is the first to bring in a large scale operation of personalised reference services in a library (1924 onwards).

He propounded several varieties of reference services based on time and effort, a criteria for identifying the varieties.

He was the first person to explicitly state that library clientele are to be initiated and familiarised to use documents and other information sources productively.

He distinguished the value of different varieties of information sources and matched them to respective information seeking behaviour of users.

He developed a narrative form of giving case studies on personalized reference service. Such narration not only helped teaching reference service to new entrants to profession but also provided a mechanism for feedback analysis for seasoned reference librarians and other colleagues in the library. In addition, such case studies should also be used in a very mild manner to inform the clientele the problem of communication gap that lie in the real need and expressed need. Such a demonstration shows the need for a dialogue conversation between an enquirer and reference librarian.

He also identified the concept of momentary time-value of enquirer's information needs and the necessity for being prepared to meet such needs in an instant and efficient way.

He developed a theory of reference service in which he emphasized the following 3 main points:

1. Every enquirer is a different person, different in his background, different in his thinking and different in the use and application of information etc. Each of these has significant impact on information seeking and its uses. (Information user profile).

2. Information is generated in such a manner that many times it is not possible to directly use it for satisfying the enquirer's information need. It has to be analysed, recombined and redressed for tuning it to various specifications of the enquirer. (Multiple angle in which information is generated).

3. The library profession should do continuous research to improve its capacity to meet the unforeseen problems in matching information needs to information sources effectively, expeditiously, and pin-pointedly. (Developmental Research in Library and Information Science).

He also developed a mechanism for keeping the reference section in a library fully aware of all the activities such as (a) preparation relating to details about the information sources and also information users; (b) Service—conducting the

dialogue, identifying the information and handing over the same to users; and (c) assimilation of new facts generated from the experience gained while doing reference service in the library. Thus he set up an operation research model or management of reference and documentation service.

He established the frame work for institutions for giving national, state and local documentation services to meet the needs of R & D people in industrial research institutions, like INSDOC, State Central Libraries, Industrial Information centres like the ones in HMT, HAL, CMTI etc.

In an effort to adopt development of modern technology particularly information handling facility to the computer, he emphasized that human aspects of reference service should be taken cognisance of. The hardware and software architecture may have to develop specially oriented machinery for this purpose, i.e. he suggested a specialised computer for doc-finder.

The contributions of Ranganathan were not merely theoretical constructed or an idealized vision. Each of these contributions has evolved as innovation to meet the challenges that have emerged in a developing information conscious society in India. While his contributions to the practical and theoretical reference service were the result of his efforts to meet the aspirations of pre-independent India, his development in documentation and information services could be his effort to meet the challenges of the developmental activities in post-independent India.

While each of these contributions of Ranganathan could be delineated upon and relevance could be drawn to today's concept, for want of space and time we could not cover all the aspects. We shall be dealing with only one aspect which would bring in the scientific approach of Ranganathan in relation to the relevance of his contributions to modern times. In short, we shall be comparing his theory of Reference Service, particularly on the analysis of information users' expressions to the modern concept of on-line information service. The main aim is to show that the reference librarian who is equivalent to modern on-line information intermediary has to develop a foundation in Information Science which provides him a strategy for meeting information needs of inquirer.

2 SCIENTIFIC MODEL FOR ON-LINE SEARCHING

In a recent article, Stephen P. Harter² has delineated the

scientific enquiry characteristics of an on-line system. He has compared the nature of scientific research and its on-line analogues to the research concepts of variable, hypothesis formulation and testing, operational definitions, validity, reliability, assumption and the cyclic nature of research. Such a model, Harter argues, is of interest not only for its own sake for the intellectual parallel that can be established between the two apparently disparate human activities, but as a useful frame-work for discussion and analysis of the on-line search process from an educational and evaluative view point.

It is well-known that on-line search process begins with a reference interview in which an enquirer's information need is explicitly expressed. This is a kind of uncovering the haziness (or fuzziness) hidden in the enquirer's information need. It is a kind of hypotheses formulation. Such things are called "Idea tactics" and "Information search tactics".^{3,4} It is a kind of on-line searching heuristic to move towards an explicit statement of information needs.

The second stage of on-line search is the Interpreters' or System Analysts' processing of the enquiry. At this stage the system analyst identifies the important sequences as given by the enquirer for formulating a search strategy keeping in mind the database architecture and information content of the system being negotiated. Here the enquirer also participate in coordinating the strategy. Here the end user's searching is akin to formulating methodology of strategy for solving problems. The first stage is of course correlated to the hypothesis formulation. On the application of the strategy for derivation of information system, we get the results in the form of citation/abstracts or even direct information as output from computer. Each output form is analysed for its information contributiveness and selected or modified or rejected by the enquirer. The selected and modified information is organized and processed to yield more conducive presentation of the data so obtained.

In Harter's own words "We have seen that among the myriad of ideas bearing on the search problem or topic, just a few are selected for examination, just as the research focusses on a few variables of special interest. In on-line searching these take the form of Boolean combinations of facets. As in scientific enquiry, these hypotheses must be operationalized, by providing definitions of variables and formulating these expressions using system capabilities. To view the selection of vocabulary and

fields to be searched as operational definitions of concepts of interest is a useful means of emphasizing the tenuous and ambiguous nature of the vocabulary selection process, as well as an awareness for the potential of making choices that can vary in validity—usefulness and meaningfulness to the end user—and reliability—having a simple meaning in a given search. Unlike scientific inquiry, assumptions can usually be avoided in on-line searching. In their place, alternative hypotheses and methodologies for testing these hypotheses can be formulated and rapidly tested. The notion of testing hypotheses by obtaining sample output before concluding the search process is an important concept that an analogy with scientific enquiry can help clarify. And certainly the overall heuristic, problem-solving nature of the on-line process can be explicated and emphasized as well.”

3 RANGANATHAN'S ANALYSIS OF REFERENCE WORK AND SERVICE

Ranganathan analysed the reference work and service into three important steps. They were, preparation, service, and assimilation. According to him, the three processes are but phases of one continuous experience. They are not temporarily exclusive of one another; they really co-exist for every reference librarian.

In the preparation stage, Ranganathan said that “In Reference service, the problem of discovery is an active one. Before undertaking to discover the information in a written form available and suitable to a particular enquirer, it is necessary to make certain preliminary investigation and surveys. The subject of interest to the library clientele in general is first to be correctly understood. The next step is to get a working knowledge of subject involved. This required careful reading of a few authoritative publications and a rapid survey of literature of the subject as a whole if the goal of such a survey is to obtain a broad skeletal knowledge of the subject, its parts and phases. It is also to discover a relationship of the parts among themselves to other fields of knowledge. It is again to acquire a wide vocabulary of the subject.”⁶ (This may be equivalent to current day concept of knowledge database and information content in the information system).

Ranganathan also stressed about the preliminary knowledge

of the sources and varieties and values about the information content. He also stressed upon the ability to gather information from a stream of sources. This may be probably connected to current day knowledge about what is called "Search strategy". Ranganathan also stressed upon the concept of knowing specialists for real, live reference service, (current day concept of matching users' profile or developing a roster of specialists and also knowledge of local, national and international document centres).

The service concepts in reference service include the following three stages:

1. Precise enunciation of the item of knowledge sought. (Modern concept of Formulation of questions),

2. Search for documents. (Modern concept of Search procedure), and

3. Giving the documents to seeker. (Modern concept of document delivery).

Ranganathan has delineated in his *Reference Service* the various factors that are involved in analysing an enquirer's question and satisfying it with documents.

Regarding assimilation, the third stage of reference service, Ranganathan pointed out that inner process of assimilation involves awareness of the content of reference book as well as nascent awareness of seekers' problems.

Ranganathan himself had summarized the essence of reference process in the following statement :

Enunciation of the Problem. The exact enunciation is often difficult of achievement. The enquirer himself has often only vague notions about it. The first few questions elicit only a very general statement of his wants. It is, usually, far wide of his actual needs. Several solutions have to be brought up to him. To one after another, he says "Not this, not this." In this way, the reference librarian has to narrow down the field for search step by step. The difficulties of the enquirer in giving an accurate straight statement of his needs are often due to genuine and unavoidable causes. He might have come across the problem in a casual conversation or in listening to a lecture or during the study of a book, not giving the reference correctly. Title of the document sought by him might have been reconstructed by him or by others for him, out of some terms occurring on the title page or in the text. Sometimes the enquirer might be interested in a particular aspect of a book; and he

might give it a title of his own just representing that aspect; with the result, he really asks the reference librarian for a book that does not exist at all. Even in such cases, it is not proper to turn him away. A few minutes of discussion with him will disclose his actual needs.

Routing. After arriving at the exact enunciation of the question, routing the investigation may often prove exhausting. No general rule can be given regarding it. Nothing can be definitely stated even about the starting point. An encyclopaedia, a gazetteer, a directory, a periodical publication, or even a textbook may provide the starting point. At the earlier stages, the range of investigation may be far too wide both in the period to be covered and in the material to be examined. Every step in the routing should aim at narrowing down those two factors. The upper limit and the lower limit of the period should be brought closer and closer. While this itself would eliminate a good deal of materials, every other possible means should be used to bring their range to a manageable size. Even within such a restricted range of materials, the method of random sampling should be adopted with great skill. Sometimes the ultimate source of information may be the newspaper file of a bygone year. A dive into its pages is very exhausting. No reference librarian would enter that stage of investigation before utilising other sources to reduce the number of issues of the newspaper to be rummaged. Again he should exhaust all the resources most sincerely before passing the question on to external agencies for further investigation. This is but proper.

Close touch with the enquirer. During the routing of the problem, the reference librarian should keep himself in close touch with enquirer either by personal conversation or by correspondence. He should keep the enquirer informed of the progress made, the difficulties met with, and the sudden turns encountered. Such reports often enable the enquirer either to re-enunciate his problem or to recollect and communicate further clues for investigation. Without such contact with the enquirer, the reference librarian is likely to go astray far too much from the actual needs.

Record of the Sources. The final information arrived at must be promptly communicated to the enquirer. He may then probably ask or write back for further elucidation; the information furnished may raise further issues in his mind. Intelligent enquirers are often impressed by the success of the reference

librarian. It makes them eager to share with him the pleasure of retracing the whole route. Experienced enquirers find details of the process adopted by the reference librarian in arriving at the information. For their sake, a full record of the sources used should be kept. Such people set more value on "becoming" rather than "being." Enquirers with such a participative attitude give the greatest delight to the reference librarian."²

4 CONTEMPORARY POINTERS FROM RANGANATHAN

Ranganathan's idea of reference service emphasises the human aspects of the enquirer's problem. Expressions of intellectual requirements of an enquirer always calls for a dialogue with another person, may be a colleague, may be a teacher, may be a student and to that Ranganathan added a competent reference librarian. This theory and practice of Ranganathan are the essence of all dialogues in on-line information service, either you build in this dialogue process into the system (by providing machine intermediaries) or provide a human intermediary. More recently the concept of user friendliness has been brought in negotiating on-line information services. The only difference between Ranganathan's approach and today's approach is that we have more flexible, amenable, hardware and software computer based information systems. The scientific method approach shown in the paper by Stephen P. Harter visibly brings home the similarity that exists in Ranganathan's approach to reference service.

Ranganathan's concept of user education was a kind of milder one, mild in the sense while he knew the lacunae of an information user in relation to his own information need and methods to get satisfied, he thought that the term "education" would add a non-reticent element, and thereby wean away the clientele of the library. Therefore he used a word "Initiating a reader." Professor Neelamegham in one of his recent articles has developed a basic difference between the three concepts, namely, (a) User friendliness, (b) User education; and (c) User assistance.¹¹

Ranganathan always used to quote Valmiki wherein Sita spoke to Rama, "I don't instruct; I only remind you out of my love and regard for you."⁹ These, Ranganathan tells us, are the words which describe what should be the correct attitude of the reference librarian. (Modern concept of Information Inter-

mediary).

5 CURRENT STATUS OF REFERENCE SERVICE : A CASE STUDY

The relevance of Ranganathan's systematic approach to reference service and blending the same with humanistic features are an art of serving information to user. This is very visible even today. This feature, I will try to illustrate with a case study which I did as a reference librarian in the library where I am presently employed⁹ :

Case study : Optics-Coherence

One evening at 7.15 p.m. the Reference Librarian (=RL) was busy scanning articles for his next documentation list on 'Bio-engineering'. A Retired Scientist (=RS) entered the reading hall hurriedly and asked RL.

RS: Where are the books on 'Optics' ?

RL: (Taking the RS to the reference collection on Optics) These are the Reference books on optics. For instance, (1) Kingslake (R): Applied optics and optical engineering, vols. 1-4, 1965-67; (2) Wolf (E), Ed: Progress in optics, vols. 1-5, 1961-66.

After glancing them for about 15 minutes, the RS turned and asked the RL.

RS: Do you have a book or volume or symposium-like thing purely on optics?

RL: Here is one (taking up a volume from the reference shelf): Proceedings of the symposium on "Modern optics," New York, 1967.

RS: Let me see this—(took the book and hurriedly glanced through the contents of the book, and then through the index of contributions). No, this is of no help. I am not getting the article I need.

RL: Sir, would you kindly tell me what exactly you are searching for?

RS: (With a look of confidence at RL, as the RL was able to help him on a previous occasion). Then here is a problem for you. You see, I have been searching for an article. . . .

RL: Sir, kindly write down your problem here (pushes forward a blank note book).

RS: (writes) *Karbowiak, Optics-coherence*. This is an article which I remember to have read in this library sometime back. The author, I am certain, is Karbowiak, but the title of the article may be something like 'Optical coherence or coherence

optics' etc. I am not sure whether Karbowiak edited the book or he is one of the authors of the book.

RL: Sir, is it likely that you have read this article from some book you borrowed from our library or some book from the lending collection because, if that is so, we need not search in these Reference books which are not lent out.

RS: I do not remember from which collection it was; but let me also see the 'issue' collection on optics.

RL: Here they are: (1) Strong (J): Concepts of classical optics; (2) Stone (JM): Radiation and optics; (3) May Garbuny: Optical physics; (4) Skobeltsyn (DV): Physical optics (Proceedings of the P.N. Lebedev Physics Institution) (5) Wright (WD). They are not covered.

RS: (After scanning them all for about 20 minutes) No, no; these are not the type of books I need. It was somewhat like an annual review or advance series. I read that book recently.

RL: Could it be last week, or about a month ago? or.....

RS: No, I mean to say this year itself, that is between January and April.

RL: You have a "Recent Additions list" for this period which we may look into.

RS: It may be either just at the end of December 1969 or in the beginning of 1970.

RL: Then we have to look up only the books on optics added to the library during this period.

RS: Yes, exactly so. At the most you may cover 1968-70 additions. Earlier publications are of no use to me. Please concentrate on these three years only.

RL: Is it also likely that this article is available in any electronics reference book or textbook?

RS: Yes, quite possible. For instance 'Advances in Electronics and Electron Physics etc.

RL: (Searched the following) Advances in Electronics and Electron Physics: vol. 24-25 (1968); vol. 26 (1969); vol. 28A (1968) and Supplements 3-4-5 (1968)...but without success.

By this time the RL thought that he should search some bibliographical tools such as Physics Abstracts, Electrical and Electronics abstracts etc., keeping in mind the period (1968-70). While scanning the Author Indexes of Physics Abstracts, the following references were found:

- (1) A.E. Kar bowiak: Proc URSI symposium on electro-

magnetic wave theory, pts 1 & 2, Delft 1967, Oxford, Pergamon 1967, pp. 1-10. (2) A.E. Karbowiak: Ed., P. J. Lawrenson and PJB Clarticoats: Communication theory: (3) Karbowiak: A close look at optical waveguides, Microwaves, vol. 5, pp. 37-46, July, 1966; (4) Pantton (G) and Karbowiak (AE): on mode conversion in Overloadwave guide tapers, IEEE Trans, MTT-17, pp. 288-89. May 1969.

All the above articles were dealt with wave theory and wave guides, and as the reference query was "Optics coherence", it was felt desirable to consult the RS again. On presenting the above list for his perusal, the RS glanced at it, thought for a while and said:

RS: If we have these references, let me have a look at them. One of these may contain the article I require. I am not sure however.

RL: Here are the references. We have all of them here except item 3 above. The periodical "Microwaves" referred is not being received in this library.

RS: Then what other journals are we getting on Microwaves?

RL: We get "Journal of microwaves" and "Microwaves" is a different publication.

RS: What is the subscription to this journal? Who are the publishers etc. Give me some details.

RL: Checked the details from the Ulrich's International Periodicals Directory and gave the following information:

Microwaves, 1962, m. free to qualified personnel in microwave field, Ed. Manfred W. Meisels, Heydon. Microwave crop....

RS: Would you kindly try to obtain this journal for me from any of the local libraries? I am in urgent need of the article.

RL: I shall try. (RL scanned through the Regional Union Catalogue of Scientific serials, Bangalore, published by INSDOC), Sir, here is a library that receives this journal.

RS: Can you get me the volume immediately?

RL: Yes, I shall try. (RL immediately wrote to....requesting the volume on Inter-library loan. The volume was received a weeks' later with a letter of apology that the volume could not be sent early as it was being used by one of their staff members). The volume was then given to the RS who scanned

it for 15 minutes and requested the RL to get one of the references cited at the footnote of an article entitled "A close look at optical wave guides" by A.E. Karbowiak. The footnote read: "This article is based on the chapter "Optical waveguides" in a forthcoming book "Advances in microwaves", vol. 1, by Dr A.E. Karbowiak, scheduled for publication in Sept. 1966, by Academic Press, New York, N.E.

On turning to "Advances in Microwaves", vol. 1, edited by Leo Young, from our library shelves, the contents page of the volume mentioned an article written by A.E. Karbowiak on 'Optical waveguides', on page 75.

RS: Ah, this is the article I wanted. I know that you people would search it out somehow or other. Thank you very much.

Annotation

1. The query asked by the RS was very broad. The RL could not suspect that a question like 'Optics-coherence' would turn out to be an article on "Opticalwave guides."

2. The request was actually an article by Karbowiak in a composite book, edited by another person. It is difficult to trace such references merely by the name of a contributing author, unless the library has analytical entries in its catalogue for all such composite books.

3. RS insisted that RL should not search publications published before 1967. He also said that he had read the article from a new book displayed either at the end of 1969 or in the beginning of 1970. But the book under reference was received and displayed as early as 7 May 1967. Therefore, our efforts to trace the book through the "List of recent additions, from December 1969 to May 1970" were futile.

6 REFERENCE SERVICE—AN INITIATOR OF A SPECTRUM OF SERVICES

The spectrum of reference service, documentation service and information service is a developmental spectrum. Ranganathan emphasized the nature of a reference service in the form of a trilogy. The interaction is between the enquirer, the reference librarian or documentalist or information intermediary, and the document or any other form of information sources. Ranganathan's philosophy of the Reference Service is expressed in the following quotation.

"Reference Service therefore happens to be the only means of rescuing books (organised information) from oblivion. Such books are to be energised with periodicals (new information), 'dowering them with our own life energy', and giving them away to their suiters. When engaged in such service, the Reference librarian attains supreme bliss. His soul may very well be imagined to him Janaka's words "Here is my daughter Sita (=picked up from the earth through its furrows). She will help you in your life's pursuits. Accept her. You will be happy. Clasp her hand by your hand."¹⁰

An apt message for modern concept of User Friendliness

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SECTION 7

STANDARDISATION IN LIBRARY AND DOCUMENTATION

7.1 STANDARDS IN DOCUMENTATION: A SUBJECTIVE VIEW

DEREK AUSTIN

A brief survey of the different classes of standards precedes an account of the stages through which a standard typically passes between its inception and its publication. These procedures are illustrated in an account of the development, and also the contents, of three international standards covering the techniques of subject analysis and thesaurus construction.

The techniques recommended in an international standard should be based upon general principles that are both language- and 'culture-independent'. It is shown that grammatical factors, related in some respects to 'linguistic universals', are used for this purpose in the standards under review. The paper finally considers how and why these factors differ from earlier paradigms such as the PMEST formula.

1 TYPES OF DOCUMENTATION STANDARDS

At least two kinds of criteria can be used to identify the different classes of standards that occur in documentation (or any other field):

In the first place, we should distinguish between those standards that prescribe the physical and chemical properties of things (including materials) and others (sometimes "called, codes of practice",) that deal with actions. Standards of the first type are relatively familiar in everyday life, and include, for example,

specifications for the colours of conductors in electrical equipment or the strength of industrial safety helmets. The second class deals with prescribed techniques, such as methods for mixing concrete or analysing foods and drugs.

Secondly, we can distinguish between official standards and what are sometimes called industry (or ad hoc) standards. The former include the various kinds of standards published by official agencies such as the Indian Standards Institution and the International Organization for Standardization. These should be seen in contrast to standards that have no official status but are nevertheless widely adopted within an industry or profession, usually because one or more major users or manufacturers issue products with specifications that others are obliged to follow almost as a matter of practical necessity. This applies, for example, to the evolution of standard speeds for disk record players and tape recorders. In some cases specifications that begin as industry standards are later adopted as official standards.

All these various kinds of standards occur in the field of documentation. A standard such as ISO 2709, the International Standard which regulates the layout of fields etc. in machine-readable bibliographic records (such as MARC tapes), belongs to the class of official standards, and it also deals with the properties of physical things. However, the majority of documentation standards deal with methods and techniques rather than things. We can also recognise systems such as the Anglo-American Cataloguing Rules, the published schedules of classification schemes such as Colon or Dewey, and manuals of indexing systems such as PRECIS, as related in some respects to industry standards rather than official standards. Different kinds of bibliographic agencies achieve at least a measure of consistency by following the practices described in these schedules or manuals, yet none of these documents has any status as an official "standard" in the usual sense; for example, none of them has been issued or endorsed by an agency such as the International organization for Standardization (ISO).

2 THE ROLE OF THE INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

The extent to which the ISO is involved in the production of documentation standards can be judged from an official hand-

book,¹ published in 1977, containing the texts of all standards in the field of information transfer. The introduction of the handbook refers to the role of the ISO as follows:

With the incessant growth of information systems, operating at both the national and international level, the need for information sharing and compatibility becomes more and more urgent. If it is accepted that a global programme for the processing of information aims to develop a system allowing efficient transfer of information, it is also evident that it must be based on a programme Standardization at the international level, based solidly on national experience and operational systems, is recognized as an absolute necessity for practical and financial reasons.

The full range of interests covered by this branch of the ISO's activities can be judged from the titles of categories used to arrange the standards printed in the Handbook:

- (a) *Bibliographic references and descriptions;*
- (b) *Presentation of documents (e.g. layout of periodicals);*
- (c) *Conversion of written languages (i.e. transliteration);*
- (d) *Document copying: Microforms;*
- (e) *Bibliographic control (including the ISBN);*
- (f) *Libraries and information systems;*
- (g) *Mechanization and automation in documentation;*
- (h) *Classifications and controlled languages for information storage and retrieval; and*
- (i) *Terminology principles.*

Some of these standards refer to specific features of things, such as a 7-bit character set for the exchange of machine-readable data, others deal with general techniques; this applies particularly to some of the standards considered later in this paper. It should be emphasised, however, that none of these standards deals with the properties or techniques of a specific documentation system. ISO can recommend standard approaches to problems, and try to ensure that the general principles on which they are based are recognised and accepted by specialists in the field, but it does not, and should not, offer instruction in the use of particular systems, such as the UDC.

3 THE ORIGINS OF STANDARDS

Standards are not produced for their own sakes; they arise in response to genuine needs encountered in practice. These needs, which are frequently voiced at international meetings such as the present conference, are generally routed in the first place to Unesco. There are good reasons why Unesco should be involved at an early stage in the evolution of a standard. For one thing, Unesco has access to resources beyond the means of any official standards agency, and these are sometimes used to commission a preliminary study of a problem and its possible solutions. When a study of this kind is undertaken, it generally leads to a document (frequently issued with a UNISIST imprint) that is capable of serving as the first proposed draft of a new standard. An ISO imprint may confer authority on a text, but the ISO cannot afford the initial research that might (or might not) lead to a new standard.

Unesco is also concerned with achieving the widest possible audience for new international standards. This is partly to ensure that documentalists involved in the establishment of new services should benefit as far as possible from the know-how of colleagues with experience in similar services, including systems that showed the need for a standard in the first place. It would be a waste of time to re-invent the wheel, and a criminal waste of time to re-invent a square wheel. Many of the major existing documentation services were established before the need for standards or guidelines had been realised, and they are likely to exhibit exactly the kinds of idiosyncracies and inconsistencies that revealed the need for a standard in the first place. The extent of these divergent practices will be familiar to anyone who has organised a search covering more than one of the data bases available through a multiple database service such as Dialog or Orbit. The indexing languages used in these bases frequently vary to such an extent that it is necessary to re-formulate the enquiry and virtually learn a new indexing language whenever the user switches from one source of data to another.

4 THE WORK OF TECHNICAL COMMITTEE IN THE ISO

As noted above, initial research supported by Unesco frequently leads to a preliminary text that can be submitted to the ISO as

the basis for a new standard. The text is then directed to whichever technical committee is responsible for the field covered by the new document. Each technical committee is served by a Secretariat which first ensures that any new document is translated, if necessary, into the two working languages of ISO (English and French), before the text is passed to an appropriate sub-committee. The work of each subcommittee is limited to a single aspect of documentation, such as terminology or indexing, and its members consist of representatives of national standards agencies throughout the world who have declared an interest in that particular topic. Some national agencies find it convenient to adopt an internal committee structure which generally parallels that of the ISO.

From this point onwards the processes involved in developing a new standard might well be described as hyper-democratic. If the members of a sub-committee believe that the proposed standard would satisfy a need and accept it as a new work item, the preliminary text is sent for review and comment to the national standards agencies represented on the committee. This invariably leads to written reactions from a number of national agencies, and these are then collated by the Secretariat ready for further review at the next meeting of the sub-committee. Unfortunately, technical sub-committees meet very infrequently (typically less than once a year), and they then face such crowded agendas that it is rarely possible to examine a proposed new standard, plus the various national comments, in anything like sufficient detail. Consequently, the work is usually delegated to a selection of members appointed as a Working Group or Ad Hoc Editing Committee, which invariably means that the onus finally falls on the shoulders of one or two individuals who are prepared to give up their spare time to editing, and if necessary re-writing, the original text, incorporating comments from national agencies where these appear to be valid and relevant.

The new revised draft is then submitted to the Secretariat for re-distribution to the national standards agencies whose members form the sub-committee—in particular, to countries which have a “p” (or participating) membership. These are the only countries entitled to vote on the adoption of a new standard. At this stage the document should have a DIS (Draft International Standard) status, and an official ISO number. If all went according to plan, the various national agencies

would then consider the revised text and return their votes in time to meet the deadline set by the Secretariat—in which case the text might conceivably acquire its final status as a full international standard in record time. In practice, some member countries are likely to register negative votes if they consider that their original comments had not been taken sufficiently into account during the revision, or they might submit an entirely new set of comments. Either result is likely to lead to another round of editorial meetings, followed by the submission of a further revised text for circulating to, and voting by, national standards agencies. Eventually the sub-committee must reach a point where it is clear that further work is unlikely to produce any useful or substantial changes. Provided that the necessary majority of approval votes has been registered, the document is then passed back to the Technical Committee with the recommendation that it should be published as an official International Standard.

It can be seen that the birth of an international standard is a slow and often frustrating procedure. The political aspects can sometimes seem more important (and certainly more difficult) than the intellectual problems. Only rarely is total agreement reached on the contents of the final version. A list of those countries which accept the standard, and those which reject it on technical (rather than stylistic) grounds, is printed at the beginning of every international standard. Despite this complex procedure, however, or even because of these cumbersome and highly bureaucratic feedback mechanisms, it can reasonably be claimed that a standard, when it is issued, usually expresses a consensus of the opinions shared among a world-wide circle of specialists with experience in the work described in the text. If the ideas contained in the first draft of a standard were so limited in scope or so unorthodox that they could not be applied outside a particular culture or language community, it is most unlikely that the text would survive so many repeated examinations by the members of so many different national agencies.

It is also unlikely that the first edition of a new international standard will be completely satisfactory, mainly because it is bound to lack adequate testing in the field, particularly in circumstances outside the expectations of its original authors. This is not, however, the end of the matter, for two important reasons:

(a) First, international standards (like most national standards) have stipulated and finite lifetimes. They must be reviewed by the appropriate sub-committee after some 4 or 5 years, and they must then be re-confirmed, or withdrawn, or re-written.

(b) Secondly, although an international standard can be adopted without change by a national standards agency (in which case it is likely to be issued as a "dual numbered" standard), it frequently happens that a national committee changes the text or uses different examples. Parts of the original text might also be expanded if a national committee regards them as inadequate. Any change of this kind effectively represents the first step towards a revision of the international standard since a national agency can submit its local standard as a possible source of a new edition when the working life of the international standard is officially finished. One of the standards used as a later example has, in fact, passed through this stage.

5 STANDARDS IN SUBJECT ANALYSIS AND THESAURUS CONSTRUCTION

We can illustrate these various stages in the development of a standard by considering the histories of three texts in a field that probably comes closest to the principal interests of Dr Ranganathan. The first describes techniques for subject analysis; the second and third deal with the principles and practice of thesaurus construction.

5.1 *Standard Methods for Subject Analysis*

The first of these standards began as a French document, *Principles d'indexation*, issued with a UNISIST imprint in 1972. The scope of the work is probably expressed more accurately, if less concisely, by its current English title, *Methods for examining documents, determining their subjects, and selecting indexing terms*.² A draft of this document (perhaps the sixth revision) was approved for publication in 1978 by an *ad hoc* committee consisting of representatives of West Germany, the Netherlands, the United Kingdom and France. Unfortunately, progress beyond that point became so slow that the British Standards Institution reversed its usual policy and issued the work as a national standard in 1978 without waiting for the international

standard (it was published with a slightly changed title as BS 6529).³ The Central Secretariat of the ISO in Geneva also decided that the time between the editing stage and the proposal to publish had become so long that the text should be returned to national agencies for a second round of votes. I mention this only as an example of the kind of "domestic" problem that occasionally causes so much frustration in standards committee work. The second vote was completed at the end of 1984 and produced an unusual 100% approval. The final recommendation to publish was agreed in May 1985 when the sub-committee responsible for this work (TC46/SC5) met in London.

It may seem strange that the ISO is concerned with describing techniques for document analysis that are known almost intuitively by the majority of practising classifiers and indexers. The fact is, however, that this first fundamental step in the indexing operation has not been adequately described in textbooks on the subject approach. This also applies to manuals on specific systems, such as PRECIS or DDC; these usually start their explanations by assuming that the subject of a document has already been identified, without describing how an indexer is supposed to discover the author's topic and intentions in the first place.

The general techniques described in this Standard can be applied in any system where a human indexer uses a controlled vocabulary (whether words or notation) to express the subject of a document in summary form; this applies not only to verbal indexes but also to shelf classifications. It is suggested that the indexer should approach the analysis of a document with a standard set of questions in mind. For example, the text should be checked for any reference to a product or final condition, an action, the object or performer of an action, and so on. These questions are intended to establish the presence or otherwise of concepts that occupy roles (such as operation or process, patient, agent, instrument or location) that are regarded as key factors in document analysis, regardless of subject field. This search for roles resembles in some respects the technique of parsing in standard grammars; this may also involve a search for answers to questions such as "What happened?", "To whom or what did it happen?", "Who did it?" and "Where?". In the published edition of the international standard these techniques are described and illustrated

in English and French, but the roles to which they relate are not peculiar to these or any other languages; they are regarded by linguists as examples of 'linguistic universals'. The extent to which they are truly language and culture-independent might be judged from the fact that every participating country (including India) returned a positive vote when the draft was circulated.

Apart from filling a gap in the textbooks, the new standard should also have practical value for agencies who are setting up their first information systems, perhaps without access to trained staff. It can also play a part in an established system—for example, it is used in the British Library not only as a training aid but also as a management tool, since it offers working definitions and recommendations on matters such as levels of exhaustivity and specificity.

52 Standards for Monolingual Thesauri

New ground of a different kind has also been broken in the second edition of the international standard on the construction of monolingual thesauri (ISO 2788).⁴ The first edition was published in 1974, which means that the work was overdue for revision. This is one of those cases where a national agency, the British Standards Institution, accepted the international standard in principle but introduced changes and different examples when it published its own version, with the same title, as BS 5723:1979.⁵ This version was then submitted as a contribution (among others) towards a revised edition of ISO 2788. Editorial work on the new edition of the international standard ended in 1984, and the standard was approved for publication in May 1985. When it is published it will be adopted by the BSI as the replacement for BS 5723, and issued as a dual numbered standard.

The new edition of ISO 2788 deals in particular with three main aspects of thesaurus construction: (i) vocabulary control; (ii) relationships between terms; (iii) management, including editorial control and form of output. A classificationist would probably be most interested in the second of these (the part that deals with fundamental relationships between the terms in a thesaurus), although the new edition does not introduce any significant changes in this area. Three kinds of basic relationships, each with subclasses, are specified and illustrated.

Equivalence relationship: (sometimes known as the "Use/Use for" relationship). A concept can sometimes be expressed by

more than one term, to the extent that terms such as "polyglot dictionaries" and "multilingual dictionaries" can be treated as synonyms for retrieval purposes. When terms form an equivalence set of this kind, one of them should be given the status of a *preferred term*: i.e. the term that is assigned consistently to documents on this topic. Other terms in the set would then be labelled as *non-preferred*; they should not be assigned to documents, but they can be provided as sources of references to their preferred equivalents in a thesaurus or index.

2. *Hierarchical relationship*: (also known as the "BI/NT" relationship). This covers three different kinds of relationship, each of which can serve as the basis for logical hierarchies where concepts are designated as superordinate or subordinate.

3. *The generic relationship*: familiar as the basis for all scientific taxonomic systems but equally applicable to concepts of any kind.

The hierarchical whole-part relationship—which can form the basis for hierarchies in a strictly limited number of situations.

The instance relationship—which links a general class, such as "cities", with specific instances, such as "Paris", "London" and "New Delhi." The superordinate term in this kind of hierarchy is usually expressed as a common noun, and the subordinate term invariably represents a class-of-one and is expressed by a proper name.

Associative relationship: (sometimes known as the "RT" relationship). This is a particularly difficult relationship to define in a positive way: it covers a number of rather vague links between terms that are not synonyms, nor do they form hierarchies, yet they appear to be so closely associated that the indexer feels that the user should be referred to one of these terms if the other has been assigned to a document. The standard lists and illustrates a range of circumstances that justify terms being linked by this relationship, but the list is far from exhaustive.

The sections of ISO 2788 that deal with vocabulary control are intended to correct a deficiency in the earlier edition, which had been criticised on the grounds that it dealt with basic relationships between indexing terms without stipulating exactly what is meant by a term. There is time for only a brief review of the main recommendations for regulating the forms, and even the contents, of indexing terms. The international standard, and also the British standard on which it was largely

based, use familiar criteria when formulating rules for choosing the forms of terms, such as singulars versus plurals. These rules are based on a distinction between terms classed as "count nouns" in standard grammars, and others called "non-count nouns." Count nouns usually refer to classes of physical things, such as "houses" "indexers" and "elephants", they can occur as part of the answer to the question "How many?" (for example, "How many houses?"), but not "How much?" (we are not likely to ask "How much house?"). These are usually expressed as plurals in English language indexes, although the international standard notes that some other language communities have different conventions. Non-count nouns refer to actions and abstract concepts (such as "indexing" and "Marxism"). and also materials (such as "paper" and "rain") Material terms can form part of the answer to a question based on "How much?" (for example, "How much rain?"), but not "How many?" Non-count nouns should generally be expressed as singulars. These rules may seem somewhat pedantic, but they simply codify a practice that is already common in everyday speech, at least in English, and they seem to be applied almost intuitively when authors are choosing their titles.

The standards appear to be on more contentious ground in offering recommendations for the treatment of compound terms: that is, terms such as "library management" and "school teachers" that consist of more than one word. It is probably true to say that terms of this kind have been a source of problems since the beginnings of indexing, mainly because they represent a primary source of inconsistencies among different indexing agencies, or even within single agencies. For example, one indexer might decide that the term "school teachers" should be retained in its unfactored form, whereas another might choose to express this topic as two separate noun components, "schools" and "teachers" each functioning independently as an indexing term in its own right.

The criteria for recognising compound terms that should be factored are best explained by taking a single recommendation and applying it step-by-step to a term such as "School teachers".

Step 1. The term should be analysed into a *focus* and at least one difference. The focus is always the noun that identifies the general class of concepts to which the term as a whole refers—

in this case, "teachers." A difference refers to a characteristic which, added to the focus, specifies (or differentiates) a subclass of the focal concept. In the present case we could have used more familiar words, such as "noun" and "adjective", to make the same distinction, but we need the special terms to explain how the same kind of logical analysis can be applied to compound terms that cannot be classed as adjectival phrases, including single-word *Komposita* in German and similar languages, and the prepositional phrases that are relatively common in the Romance languages.

Step 2. The indexer should determine how the focus and difference are logically related. In the present case we can say that "school" (the difference) refers to a whole, and "teachers" (the focus) represents one of its parts.

Step 3. A check against the standard would show that a term should be factored if its parts are related in this particular way. The new edition of ISO 2788 contains the following clause:

A compound term should be factored if the focus refers to a property or part (including materials), and the difference represents the whole or possessor of that property or part.

This means that "school teachers" should be factored into two noun components, "schools" and "teachers", and both should be assigned consistently, as separate terms, to documents on this topic.

The other recommendations in the standards are based on broadly similar criteria, involving a mixture of logical and grammatical factors. I hope it is entirely clear that applying these criteria is easier, in every case, than describing them. From an indexer's point of view there is little doubt that the recommendations in the standards go a long way towards removing some of the more obvious causes of subjectivity in indexing, and they also reduce the level of difficulty of many indexing decisions. This can be illustrated by assuming that an indexing agency, working without reference to the standard, had admitted a term such as "school teachers" into its indexing vocabulary. This adjectival construction should then, for the sake of consistent collocation, serve as a model when dealing with later documents on other kinds of teachers defined through reference to their schools, but the model will eventually break down when an indexer encounters a work on, say, "part-time teachers in

secondary modern schools", which cannot possibly be handled as an adjectival construction. This problem would not have arisen if the standard had been applied correctly in the first place: the concept "secondary modern schools" can be assigned to the category "schools", and "part time teachers" can also be subordinated to "teachers", without infringing the standard in either case. These simpler terms offer exactly the same access keys for retrieval purposes; the subject remains undistorted; the terms are also under a more predictable control.

53 Standards for Multilingual Thesauri

The third and final standard deals with procedures for establishing thesauri containing terms from more than one natural language. Unesco is especially concerned with the exchange of information across the language barrier, and commissioned a preliminary study of the problems involved in establishing standard procedures for constructing and presenting multilingual thesauri. At one time these problems appeared to be so formidable that the goal of a standard code of practice seemed almost unattainable. The preliminary text prepared for Unesco went through a number of revisions before it was rejected, and success was eventually achieved only through the adoption of a relatively simple approach to some of the major problems associated with multilingualism:

First, it was decided that the standard would not, and could not, deal with a special class of difficulties that will inevitably arise if a new multilingual thesaurus is planned as a direct translation of an existing monolingual thesaurus, but the editors of the original (source) text will not allow changes (whether to terms or structure) to handle problems encountered in the target language(s). If the compilers of a multilingual thesaurus are faced by this situation, the Standard suggests that they should abandon any attempt at translation and being the work *ab initio*.

It was also decided that the multilingual standard should not deal with general principles or techniques that are common to all types of thesauri. These will be handled in the new edition of the standard for monolingual thesauri, which will contain (as noted earlier) accounts of the basic thesaural relationships together with language-independent recommendations on vocabulary control. The status of the monolingual standard (ISO DIS 2788) was therefore slightly changed, and it became a basic text

serving two related purposes.

These simplifications succeeded to such an extent that the draft standard on the construction of multilingual thesauri passed through its various editing stages faster than the monolingual standard on which it partly depends. The multilingual standard was published in 1985 as ISO 5961.⁶ It was then adopted without change by the BSI as a dual numbered standard, BS 6723.⁷

Since the multilingual standard is not concerned with general matters such as basic relationships and vocabulary control, it is free to concentrate on the sufficiently difficult task of describing procedures for establishing conceptual equivalences across a range of different languages. The rationale behind this goal is clearly enunciated in the Introduction to the Standard :

Indexers and searchers should, where possible, be able to work in their mother tongues, or at least in a language with which they are already familiar.

Experience among a number of agencies involved in multilingual indexing has shown that the majority of terms encountered in day-to-day practice (as high as 90 per cent in many cases) can be translated without difficulty into acceptable equivalents in one or more other languages. This does not necessarily mean that every language in a multilingual network possesses exact semantic equivalents to most of the terms in the other languages, but rather that indexers can usually establish equivalences that are close enough for the practical purpose of indexing and retrieval. This also means (as so often happens) that the most complex procedures described in the standard were developed to deal with a set of situations that occur least often in practice.

The Standard is organised according to 5 levels of difficulty, ranging from "least difficult" (meaning that it is a relatively straight forward matter to match a term in one language by an exact equivalent in another language), to "most difficult" (the target language cannot express, in terms that are acceptable for indexing purposes, a concept encountered in a source language). It is worth noting at this point that many potential translation problems can be avoided if the rules for vocabulary control developed for the monolingual standard are applied consistently to each of the various languages in a multilingual network. This applies particularly to the rules for factoring compound terms:

it is easier to establish satisfactory equivalences to the components of compounds rather than the terms themselves. For example, direct translation into English or French of the German term "Lehrerbildungsgesetz" would call for complicated paraphrases such as "Law of education of teachers" or "Loi sur la formation des enseignants", neither of which would be regarded as a satisfactory indexing term. A shorter expression, closer to the original German, can be achieved in English ("Teacher education law") but not in French. This problem would be avoided, however, if the original German expression is factored into simpler morphological components that are amenable to direct translation:

Gesetz	=	Law	=	Loi
Lehrer	=	Teachers	=	Enseignant
Bildung	=	Education	=	Formation

The German original could still be retained in the indexing language, but it would then be given the status of a non-preferred term and function as the source of a reference guiding the user to the appropriate combination of simpler elements.

For the sake of easier demonstration, the problems and solutions covered by this Standard are illustrated in only three languages, English, French and German, but they are described throughout in general and language-independent terms, and it is emphasised that these problems are likely to occur in any multilingual environment. If a national standards agency intends to publish a local standard based on the international standard, it should be a relatively simple matter to choose suitable examples in the local language.

6 CONCLUSIONS

We can, perhaps, draw two general conclusions from this survey of work associated with a small selection of standards. The first conclusion might concern an agency that is setting up an information system for the first time or overhauling an existing system. It is not difficult to see how inconsistent practices by documentalists can waste the time of the user. This was regarded as a serious matter when the Five Laws were formulated, but it becomes even more critical in a computer-based environment: time wasted during an on-line search can be very expen-

sive. Some sections of the standards considered here were developed at least in part as reactions against two-wasting idiosyncracies found in some of the major data bases currently available. Ironically, some of these data bases have now become so large and well established that it would be difficult, to say the least, to bring them into line with standard practices, even though they revealed the need for standards in the first place. There is, however, no reason why this situation needs to be copied or perpetuated by documentalists who are setting up new services or planning new networks. There are sometimes advantages in being late.

The final point concerns a detectable shift towards new theoretical bases for ensuring consistent practices in subject analysis and indexing. Dr Ranganathan stands, without doubt, as the principal pioneer in this field, and his PMEST formula represents the first significant step towards a general paradigm for subject analysis. Some of the standards considered here also deal with paradigms developed for this purpose, but they indicate a trend towards new kinds of factors and criteria: in particular, factors that are sometimes known as "linguistic universes", related to generalised roles such as 'action', 'agent', 'patient', 'location', etc. It is not difficult to identify correspondences between these different schemata, and assert, for example, that 'energy' equates to 'action'. This is probably true as far as it goes, but it is neither useful nor reasonable to overstretch the analogy. These schemata are different simply because their purposes are different. PMEST is intended to organise concepts, expressed by notation, as a sequence that reflects their relative significance as indicators of shelf position. The new criteria are not concerned with relative significance of this kind; they deal instead with the selection and content of verbal (not notational) retrieval keys, using grammatical criteria that are also language-independent as far as possible. Insofar as enquiries of this kind are never finished, I believe that the next stage of theoretical advancement might involve the search for a common logic underlying both kinds of schema.

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SECTION 3

EDUCATION AND TRAINING IN LIBRARY AND INFORMATION SCIENCE

8.1 The Position of British Library Education Today

PETER HAVARD-WILLIAMS

British library and information science education has to be seen against a background of long development and rapid change in the library and information activities of the nation. Also important is the changes in the technology and economics of printing, and the consequent development of high technology in publishing and automated information sources. All this has resulted in increased information flow, increased facilities for information handling, new career opportunities, but with problems for economic recession. The seventeen schools of library and information science are now facing a current national enquiry which is concerned with change, but schools have been in the throes of curriculum revision for some years. Now major curriculum change is needed every three or four years. The task must be to cater for continuity, keep a vision of the curriculum as a whole and yet be hospitable to notions of change. A core curriculum will be concerned with management, indexing and sources of information but the choice of specialisation must depend on the student. Standard education is at the postgraduate level, but there are first degree courses, and para-professional education needs to be promoted, probably through distance learning. High quality education requires high level training programmes in library/information centres. British library education results from the efforts of a consortium—library and information science schools, libraries and information centres, central government departments, the British Library and other funding bodies.

To understand current trends in British library and information science education, it is important to appreciate the changes in attitudes to libraries and information work which are taking

place rapidly in the United Kingdom. It is, in fact, difficult to present a view precisely because change is so rapid.

Libraries in Britain are not the outcome of an overall governmental policy, but have arisen from specific needs for books, serials and other documents and for information at different times and in different clienteles. Moreover, they have arisen over a long period—manuscripts from the sixth century, college libraries from the fifteenth century, university libraries from the seventeenth century, national libraries and subscription libraries from the eighteenth century, special and public libraries mainly from the nineteenth century, each overlaying the already existing provision.

Information has of course existed since the beginning of communication—information as a concept—organised information—has arisen with the development of complex industrialised societies, and particularly with that of the last hundred years of scientific and technological innovation. This latter development, begun in the seventeenth century, has seen an acceleration with the development of science and technology and this has been accentuated with the technologies of war (hot and cold) in the twentieth century.

The invention of the computer has made possible the manipulation of data in ways inconceivable forty years ago. The application of computer methods, too, has broadened so as to make computerised information both feasible and easily accessible. This has revolutionized information handling and processing. Another important element in the change of 'climate' in the information world is photocopying. The bane of publishers, photocopying has made possible the dissemination of information on a relatively cheap, easy and widely diffused scale impossible before World War II. Though microfilming has not proved to be the panacea forecast by Fremont Rider in 1940 it also has had a considerable influence on the diffusion of information, and must not be underestimated. Lastly, within the last ten years or so, we have seen the 'convergence' of technologies in which there can be computer input to the television screen, where audio-visual methods relatively unsophisticated in themselves can be transferred too to the television screen, where computer graphics can be developed, where optical discs can produce text and graphics, and so on.

It is not only the processes, and the information produced by

them that matter. It is the climate of opinion that is produced by them that is affecting the information world. The way has already been prepared by the progress of television and the resulting fact that the majority of the population accepts as a part of everyday life that it receives not only entertainment through the medium but also world and local news, and a good deal of explicit or implicit educational material – in terms of world politics, history, technical and scientific information (including information on agricultural, medical and health and welfare and industrial and commercial information). All this alters attitudes to the book and printed materials in general, and places them in the category of being one means among others of obtaining information.

Printed matter itself has also contributed to the change. The past forty years has seen a vast change both in the technology and in the cost of printing. The period has seen a change, too, in where the printing is done. Economic considerations have played a major part in new developments both in publishing and printing, where new adjustments have had to be made to keep these activities within the scope of profitable business. There are those who consider that the publishing and printing of much scholarly, scientific and technological information will become so expensive and uneconomic by the turn of the century that much of the secondary material (abstracts and indexes) now available on-line and in hard-copy (book form) will be available only on-line. This is because the major market for this material is in industrialised countries, and it will be the major market that will dictate publishing policies.

Consider, for instance, the following example of information technology applied to the realm of books. Since a library can be reproduced on an optical disk and a book on a card the size of a credit card, it is not difficult to imagine taking such a card to bed with you providing you have a reader the size of the currently available Sinclair television set. If an optical disk or disks can reproduce the content of a reference library, and there is telex or facsimile communication readily available, the information officer and reference librarian can work at home, and communicate with his or her clients without coming near an institutional building. The technology is already there, what is needed is the necessary commercial breakthrough, and the marketing to persuade people to use the new methods.

This may seem a far cry from library education, but in fact this kind of background is influencing current thought on curriculum development. There are other influences. The whole attitude to purveying information is affected by TV with sophisticated methods of production and presentation. Education in the United Kingdom is being affected: children expect the same kind of expertise shown in the classroom as they see on the television screen, or they become bored, according to a recent interview with a secondary school teacher. This also must affect their attitude to the effort of understanding the printed page, and the whole *ambiance* of information/library services, and educational method.

The world-wide recession is resulting in a constant search for economies. This affects commerce, industry, government and the community at large. Since libraries in particular have traditionally been a government concern, and government economies are affecting libraries both nationally and locally. These economies also affect international provision, since financial retrenchment cuts services which in turn limits scope for international action to the detriment of international co-operation. The British Library Lending Division is no longer searching for 'not in stock' material on the scale it has done in the past, according to a librarian in a country not too far away.

While, overall, public libraries have managed to retain a small increase in their budgets they have also sought to widen their readership by producing better services to a greater proportion of their potential readership and so, in real terms, their moneys are less than they were. While a reading public of 25% using public libraries was considered a remarkably high figure twenty years ago, a figure of 50% is now regarded as a maximum figure in Britain. Hence, libraries have services ranging from special collections for a limited clientele (the Shakespeare collection at Birmingham, the Henry Watson Music Library at Manchester, the Roscoe Collection at Liverpool) to services for the aged, ethnic minorities (Leicester, Derby, the London boroughs for instance) prison services (Nottingham and others) also serving specific sectors of the population but with a different philosophy of provision, viz. to serve not the few but the many. All this has affected general book provision, has tended to reduce stocks and made public

libraries turn to low-cost books, and not least to move to paperbacks. From the library educator's point of view, it has limited recruitment, too, for economies have had to be made in personnel as well as materials. In university libraries, cuts in personnel have been even more severe and few posts are advertised each year (for which there may be too many candidates), though there is a dearth of candidates for posts at the top (*i.e.* directors of university libraries). In college libraries, there are also few openings, though in schools more posts are becoming available, because of an awareness of the need especially in large schools to develop school library resource centres with appropriate professional staff. Openings are also increasing in the private sector, with advertisements for librarians/information officers in industrial libraries, professional offices (architects, lawyers, construction firms). There are also opportunities for graduates in broadcasting, education, management, marketing, database production and educational technology.

It is against this background of :

- (a) increased information flow;
- (b) increased facilities for information handling;
- (c) a widening of career opportunities;
- (d) the problems of recession, and a consequent limitation of the traditional openings for students;

that present changes in curricula are being considered. Currently, there is a national committee considering the teaching of library and information science in both universities and polytechnics in Britain. Its role is:

To advise on the current provision of, and likely needs for, library and information courses at institutions within the areas of responsibility of the University Grants Committee, the National Advisory Board (for Polytechnics and Institutes of Higher Education) and the Welsh Advisory Board, taking account also of institutions within the responsibility of the Scottish Education Department and the Department of Education, Northern Ireland, and to make recommendations for action. This will involve a review of likely future demand (both in terms of numbers and of expertise) for library and information professionals and of the courses provided by

each of the library and information science schools, bearing in mind the changing nature of library and information work.

There is widespread belief that it has also been established to recommend a reduction in student, and therefore staff numbers and resources, though this is denied by the committee's chairman, Professor Brian Morris. Once the opportunities for students are broadened, it is difficult to determine the job opportunities. My colleague, Dr. J.M. Brittain with a grant from the British Library, is trying to determine future opportunities for student employment and lay the foundations for curriculum development of a very different kind from the traditional 'library and information science' pattern. This was begun in our own departmental interest as part of the assignment of a Task Force we set up early in 1984, to consider the future of our curriculum and its effectiveness in preparing students for wider opportunities. But it has taken on a national significance with the appointment of the Trans-binary (national) committee on library and information science with an interest in looking at the effectiveness of current educational patterns in the subject. The future that lies ahead therefore seems, at the present time, both uncertain and challenging.

It would, however, paint a false picture if one gave the impression that we now face sudden change.¹ In most departments of library and information science in Britain, there is continuous revision of syllabuses depending not only on the changing nature of the subject, and the changing demand, but also in response to staff changes, and hence changes in expertise. With the retirement or resignation of staff, opportunities are created of introducing new subjects, as staff teaching the traditional subjects of the curriculum are replaced by staff specialising in information technology, reprography, non-book media, computing or ergonomics. But the changing scene of professional practice also impels a compulsive urge to revision. In my own department, and I guess we are not atypical, we now reckon to be engaged in continuous revision from year to year in response to preceived needs, changes in staff offerings and expressed student opinion. But we also reckon to make a major revision every three to four years or so. With so much change in the air, one must also be conscious of the importance to the student of continuity. Students need a balance between change

and stability, and the effect of change on the social stability of the department has to be taken into account. Change to be effective must not be too drastic, must be well planned, and announced in advance, if students are to have confidence in the management and administration of the department.

Moreover, what is so difficult about curriculum development in library and information science is the problem of seeing it as a whole, and achieving for the student a coherent whole. Politely, the subject is considered to be 'interdisciplinary': in fact, this means that it is an amalgam of subjects—logic, linguistics, systems analysis, indexing, information sources, management, psychology, bibliography, collection management and development, literature, history, etc. Since it is, as yet, an unstable discipline, it is subject to fashion. The difficulty about fashions is that a sudden insertion of a new subject arising from a new fashion can result in a distortion of the syllabus. What then is one to put in, what to leave out? What is the core curriculum?

In a document produced by Unesco in 1974 for the NATIS Conference, there was a statement of the core curriculum as seen at that time;² this was updated in a volume published to celebrate the centenary of the British Library Association in 1977.³

A core curriculum in documentation, library and archives studies: (See Table on page 573).

The core curriculum, in my view, still exists though its expression in principle has become simplified while the content has become more varied and more specialised to cater for wider employment opportunities.

Management

Indexing

Sources of Information

Information Technology

The intellectual content has been very considerably developed. Logic and systems analysis lie at the heart of the discipline which has been interestingly expressed and elaborated recently in an 'Online curriculum for a postgraduate training course for information specialists in the field of social sciences'.⁴ This includes

<i>Courses</i>	<i>Information Science</i>	<i>Library Studies</i>	<i>Archives Studies</i>
Foundations (Masonry)	Sociology of information History of science	Library in society Library legislation History of libraries and library education	Economic history Legal history Social
Materials	Scientific communication Theory of communication Research methods	User research	Genealogy, heraldry
	Various formats-reports, documents data (ideas)	Research methods	Research methods
	Information services	Various formats books, serials, new media Reference sources Bibliographical tools History of book arts	Various formats manuscripts, maps letters Registers, inventories etc. Bibliographical tools
Methods	Indexing, contents analysis Documentary languages Storage & retrieval Data organisation Information dissemination Systems analysis	Indexing, contents analysis Reader services Organisation of knowledge Reference processes Systems analysis Preservation and restoration	Registry systems Palaeography Museum techniques Records management Library techniques Preservation and restoration

(Contd. on p. 574)

(Contd from p. 573)

Management	Management and administration	Management and administration	Management and administration
	Personnel	Personnel	Personnel
	Systems organisation and planning	Systems organisation and planning	Systems organisation
	Legal aspects	Type of library operation	Type of archives operation
		Legal aspects	Legal aspects
Mechanisation	Computer and reprographic technology	Computer and reprographic technology	Computer and reprographic technology
	Educating the user	Educating the user	Educating the user

1 General theoretical fundamentals of information and documentation work.

2 Methods and techniques of information processing.

3 Special problems of the development of information retrieval systems and the dissemination of information.

4 Survey of national and international information systems and their management and planning.

5 Problems of relationship between information and documentation and librarianship.

6 Further problem areas (languages, copyright, communication science, etc.)

To be added: organisational, resource and personnel management. Another formulation, much older but still valid is that given by Schur and Saunders in 'Education and training for scientific and technological library and information work'.⁵ This proposed

1 Scientific and technological communities and their information and library needs;

2 Sources of information;

3 Techniques (by which 1 and 2 are brought together):

(a) The organisation of knowledge: principles and techniques of information storage, retrieval and dissemination.

(b) Techniques of library/information unit organisation and management.

The notion of the 'community' which exists around information and library services is important. Pioneered by the Department of Information Studies at Sheffield, it emphasizes the fact that, whatever the kind of service it is set in the community for which it provides—educational, institutional, industrial concern, professional practice, national, business, or local community. To often in the past, libraries (particularly) and information units, have been regarded by the professionals working in them almost as closed systems, whereas, as Ranganathan realised many years ago, they are service units to a larger organisation or community. Their operation must therefore be seen in terms not only of the efficiency of the system but also in terms of the effectiveness of their operation, *i.e.* providing the best and most appropriate service to the greater number of users within their community at the lowest

cost. For this reason, university libraries must be considered, analysed, organised and managed in the context of the university systems as a whole - and likewise for documentation centres, special libraries, college, public and school libraries. These latter three, alas, are treated in a mounting order of unimportance in developing countries, whereas they should be taken very seriously as having an effective contribution to make to the fundamental development of the country as a whole. This can be done only if ministers and politicians understand reading and information needs, and the role these services might play in community development. One sometimes wonders whether in developing countries (and perhaps in industrialised countries too) politicians do not wish to develop things too much, for then the population might know too much and give them too hard a time ! (It has been said, for instance, of comprehensive education in Britain.) It remains true, as the NATIS conference affirmed eleven years ago that information is central to modern community development:

Information is an essential part of a nation's resources and access to it is one of the basic human rights. The formulation and implementation of a national information policy is the only way to ensure that all who engage in administrative, educational, scientific and cultural activities have access to the information they need. Priorities in national planning must, therefore, be reflected in specialized information sub-systems.

Information is not only a national resource vital for scientific and economic progress, but also the medium of social communication. personal, vocational and social development of the individual depends on the amount, quality and accessibility of information to such a user. The ultimate aim of an information policy must, therefore, be an informed society.⁹

A further point to make about the development of the curriculum is that a world perspective is now essential. It has been stated many times that no library 'is an island of itself' and that even the great national libraries in Britain, France, the United States and Russia, for instance can no longer attempt to maintain world coverage of publications and documents.

They never have, but they imagined they did. With the development, for instance, of Unesco/IFLA programmes such as Universal Bibliographical Control, the Universal Availability of Publications, the Transborder Transfer of Information and Conservation, and the activities of FID and the International Council on Archives, no educational programme can either confine itself to consideration of services within its own borders, or, equally significantly, omit to evaluate these services against world standards and world practice. The latter requires perception, courage, powers of analysis, a faculty for positive action to influence the limited community of practitioners, government, and the wider community at large. (As a colleague said to me thirty years ago when I became a university librarian, 'Librarians are known and remembered for what they do, not that they say! I took that to heart then, and as a library and information educator still do today). No less important is the world perspective given by technology. This applies particularly to international data bases and data stores at the present time, though the technology of facsimile reproduction, optical disks, other new technologies, reprography and non-book media generally must not be ignored. Indeed, the ability to absorb different technologies in the service of information, and to use them appropriately is part of the intellectual effort required in studying the subject at a professional level.

We have, then, a curriculum, at this stage of the argument, with a world perspective both in general conception of information and library services and in techniques, a community perspective with consideration of the place of the information service or library service within the community it serves (industry, education, the public at large) and connecting the two, of course, a national perspective within which practical planning and a philosophy of services must exist. This must rest on appropriate management teaching, the sources of information, and its organisation, and the required techniques, whether traditional and manual, or *via* other technologies.

This brings me back to thinking about the curriculum as a whole. The danger currently is that computers will dominate the scene. Professor Saunders, in a paper to the Irish Library Conference in Cork in 1980 stated :

I think those of us concerned with education and training

have a duty to overcome . . . 'the fear of the machine', while at the same time avoiding . . . 'the worship of the machine'.

You will note, I am sure, that I group the computer with other technologies. That is deliberate. It is important to consider the aims, the 'ends' of the service rather than the means—a point of view with which Ranganathan would have agreed.

If you think the argument is too information science oriented, do not be deceived. What about the recent flavour of the month, 'conservation'? When we thought, at least at Loughborough, we had got the balance of the curriculum just about right, we heard of the concern of the British Library about conservation and the consequent investigation and report of Dr. F. Ratcliffe, Librarian of the University of Cambridge and Visiting Professor at Loughborough, on the importance of conservation.⁸ I have written at some length elsewhere on conservation⁹ (and indeed we had already been thinking about it at Loughborough), so it is not proposed to deal with it again here. It is, however, important to point out that conservation is no longer a matter concerning old books alone, but it is relevant to most of the publications of the last 150 years, i.e. since the invention of chemical paper and, more recently, new methods of binding. It is relevant to the books we buy today.

Why conservation is important in the context of this paper is that it underlines the fact that, while we must pay due attention to developments in information technology, we cannot afford to neglect the book. This will still remain even if, as Professor Lancaster thinks, most, if not all, publications of a learned nature will not be in book-form by the end of the century, but will be on-line, or on optic disk or in a form of technology about which we do not as yet even know. Books will remain, and will still be actively used (even if used differently) because we have five hundred years of them in a relatively consistent and modern format, and more than a thousand years of them in the West in other forms, and for yet a longer time in the East. The danger, today, is indeed that we are all too prepared to wipe away history, and to neglect or to forget what has happened in the past. There is a danger of this happening among librarians in Britain at the present, and it tends to be happening elsewhere. While it is important to teach about computers, it is equally important to convey

the significance of the development of culture, and its organisation and preservation in durable form.

How then do we achieve a balanced curriculum? We must provide, it seems to me, a core curriculum as outlined above. This must be argued with options which students can choose. This is perhaps a coward's way out of a difficulty. The danger is that we *think* we are giving an overall rounded education, when in fact we are giving bits and pieces of education. The student is choosing for himself, and we may be abrogating our duty to see that he/she has everything necessary for his or her professional career. In a perfect world, this might be so, but it is my view that students are best motivated when they have control over what courses they wish to pursue. We thus (like most departments or schools in Britain and, even more, in the U.S.) offer alternatives within the core course—specialisations in management, computer applications, sources of information. Within this the student has a further choice since he or she has a considerable say in the topics of his or her coursework. In other words, there is a basic structure, within which students can choose and specialise. Moreover, while, in general, it is useful to undertake studies which will be appropriate to their careers, I still hold the view (old-fashioned though it may be) that within limits it is not so important as to what they study, but how well they study. The relevance considered so necessary today may be given not only strictly in connection with the subject-matter, but in the theoretical plus practical orientation of the studies involved. This will vary according to the age and cultural development of the student: the many experienced students we receive from other countries are encouraged to undertake projects directly relevant to their country and their needs. The fine library building planned by James N'ganga, Librarian of Kenyatta University of Nairobi, for instance, was planned during his year at Loughborough—tangible enough evidence of what a mature student can achieve within a master's programme.

There is a view that we should be able to send out the 'complete informatist'. This is based, in my view, on a mistaken view of what university education is. We can introduce students, even at the postgraduate stage, to a subject, we can make them think, introduce them to problem solving

methods, and we can try to give them a professional orientation—this is at least as important as the subject-matter. But we cannot hope to teach them everything. No student of mathematics, physics, English or history, management or sociology knows everything about his subject when he leaves university, and professional practitioners should not expect more of library and information studies. Nor do I think that we should expand into two-year postgraduate courses—certainly not in the United Kingdom. This is because the subject is as yet insufficiently developed, though it now has a strong intellectual content, demanding capacities both for literary and numerate expression. It is only within the last five to ten years that it has offered an interdisciplinary study that is intellectually demanding—in indexing, management, information technology and sources of information. A two-year course would bore students to death, because they are looking for a practical orientation and application already in the United Kingdom after a three or four year intensive honours degree and a year's practical experience. Two programmes are now being planned, first, are an M.Sc. in Information Science and Drug Chemistry, Materials Technology, Ergonomics, and other subjects. These aim to aid in producing specialists in a specialised field with particular information expertise in their own subject. One of the complaints of scientists is that information scientists do not really understand the information problems in their field. Dr. Brittain's recent volume reporting the proceedings of a seminar concerned with medical information¹⁴ points this up, and tends to show that where information is most difficult for the specialist to find, it is even more difficult for the information scientist. The kind of course now envisaged will go some way to meeting this problem. Secondly, plans are afoot for an M.Sc. in Information Resource Management to meet the demand for graduates to manage the information resources of organisations in the context of information technology. This will include courses in the information environment, information studies, management studies, information technology and computing.

So far, I have assumed that we are considering primarily a postgraduates programme, normally of one calendar year, with taught courses. I would add that I think a well-developed dissertation is essential, and gives students an opportunity to

learn about research methods within the subject, and provides them with the basis of a useful completed project with which to begin their careers

This approach, however, neglects a number of problem areas. The first is that the profession as a whole has concentrated far too much on professional education and not enough on education for professionals. By this, is meant the necessity to see professional development as a whole : this includes :

- 1 general education (a degree in a specialised subject)
- 2 a period of pre-professional training
- 3 professional education
- 4 pupillage period in practice

We should not state that information/library education lasts a year, but that it takes, say, three plus three years, i.e. six years, including 1-4 above. As ever, we underestimate ourselves. This *schema* emphasises, too, the importance of training *versus* education. As Professor Saunders has recently pointed out :

. . we cannot *hope* to turn out fully-fledged, fully-trained cataloguers, classifiers, reference librarians, bibliographers. These are skills for which we in library schools can prepare a basic groundwork.¹¹

If departments of information and library science are doing their work well, then :

the training responsibilities of the employing librarian towards new entrants to the profession are, therefore, extremely important.¹²

There must be a partnership between teaching institutions and the profession to provide programmes combining both education and training, and this will depend on the practices evolved in different countries. As employment opportunities widen, and employers are found to be organised in very different professional societies in the United Kingdom, this of course becomes more difficult. But the basic problem cannot be ignored : the more highly developed the education, the greater necessity for adequate training. In this connection the Library Association has published a series of guidelines for training programmes, for example 'The establishment of local co-operative training schemes', which deals with co-operative efforts in training.

This partnership in education and training also involves graduates at bachelor level in library and information science, and para-professionals. The primary education for professional workers in the information and library world must be at the postgraduate level, since a degree in a subject specialisation is required in most senior posts, and all of them in national, tertiary education, and special libraries. What is then the place of the graduate (B.A. or B.Sc.) in library and information science? Currently our graduates are getting posts in public libraries, polytechnic libraries, small special libraries, and junior posts in academic libraries, where subject specialisation is not required. A few have been promoted to senior jobs. In the future, it is likely that the B.A./B.Sc.'s will do more of the basic library work, while the major information and library posts will go to postgraduates. However B.A.'s and B.Sc.'s do have their advantages, which must not be ignored: they are much better trained as librarians, because they have greater time to learn about library and information problems over three years, and do not suffer the intensive education received by postgraduates. They do not, however, have the same range of subject knowledge, and this tends to be a disadvantage in the contemporary specialised information oriented world in which we live. However, Leeds, has maintained a B.Sc. in Information Science since 1968 (with some difficulty in attracting students) but with the tremendous development in information technology and a change in student attitudes, there is room for a new look at an information science degree. A new generation of students is appearing who seek education leading to careers in a wide spectrum of information activities, and will include computer studies. Alternatively, it may well happen that bachelor's degrees will become subject degrees like any other, i.e., not solely vocational—indeed, it is already happening—and students will expect to add a vocationally oriented master's degree in information science, computer science, management, etc. Departments of library and information science are currently producing about equal numbers of both, though at Loughborough we are producing twice as many postgraduates as graduates (largely the consequence of government policy in curtailing undergraduate numbers).

Where Britain has fallen down is in the education for para-professionals. Since the 1960s¹²² we have had a 'library assistant's certificate' of a relatively elementary

character, organised not by the library Association, but by Royal Society of Arts. The Paulin Committee¹⁴ in 1978 recommended para-professional certificates in library work at OND and HND level, but instead of doing the work themselves, they left it to the Business Education Council, and the results have not been very successful. There is still a vacuum here that needs to be filled. For them and the graduates the total preparation for work at an appropriate level too needs to be considered. For graduates, the content of the degree must be more general in character 'giving a liberal education through a vocational subject', and for para-professionals, it is necessary to have a general education at least to the 16 year old level, and preferably a little more. Both require pre-professional pre-para-professional training (of perhaps a more limited kind and for a shorter period), both require pupillage period on acquiring their qualification.

H. Schur,¹⁵ in an important contribution in 1972 outlined different levels of performance for which different educational programmes were necessary—technical assistant; first level professional; second level professional; advanced professional, *or*, in terms of qualification, para-professional, graduate, post-graduate, and further degree. So far I have dealt only with basic qualifications, but advanced masters' degrees have been offered for some time at London, Loughborough, Sheffield as well as at some of the Polytechnics (Leeds, Manchester) and the College of Librarianship Wales. Recently, however, the desire for a further degree has received considerable impetus from senior librarians, and we at Loughborough (aided by a grant from the British Library) are having discussions with the Open University and others on an M.Sc. in Library and Information Management by distance learning for full-time senior librarians in post, who feel they need some further education, particularly in Management. The University of Wales also has a degree in management for librarians, and the degrees at Manchester and Leeds include a management content. This is, of course, part of the concern for continuing education, a great need in a profession (or a group of professions) which is/are growing so fast. At Loughborough, for twelve years or so we have had a master's degree for qualified, non-graduate, librarians which provided for the needs of 'middle management' librarians, and other schools have provided more conventional offerings (as mentioned above). The professional associations (Aslib, the

Library Association, SCONUL, the Institute of Information Scientists); the departments and schools of library and information science and the British Library have all been active in organising courses and conferences, seminars and workshops at various levels, and on a large variety of subjects to meet the needs of developing professional interests. Further, the elaboration of M Phil and Ph.D. programmes (by thesis alone) has provided an additional means of giving an opportunity for research effort on the part of a small but select group of librarians and information officers who have wished to pursue their studies further.

One cannot omit a mention of the influence of the British Library Research and Development Department on the development of professional education. It is with assistance (financial, intellectual and moral) from the British Library that schools and departments have been able to build up their research potential and their information technology teaching. Much of the teaching of computer applications has resulted from grants from the British Library R & D Department to individual institutions. Moreover, the Department has supported Centres (including LMRU/CLAIM at Loughborough) which we have added to publication in the subject and helped to transform practice. The Library and Information Services Council (and its predecessor, the Library Advisory Council) has also produced a number of reports which have influenced national policy for the better, and helped to clarify the minds of practitioners, administrators, teachers and students, alike. One has also to pay tribute to international governmental (Unesco, Unido, WHO, FAO, etc) and non-governmental (IFLA, FID, ICA, IFIP, WIPO) organisations which have also over the years provided a considerable number of publications. These have broadened the scope of library and information science education, and made our students less insular in outlook.

Last, but not least, one must mention the British contribution to overseas library and information education. This contribution has been effective for the past thirty years at least, any many librarians and information workers in Africa, Asia, Latin America and Oceania owe some, or all, of their expertise to British library schools. Aberystwyth, Leeds, London, Loughborough, Sheffield are towns well known to the worldwide library community (particularly in the Commonwealth,

but also elsewhere). At Loughborough, many well-known librarians were trained in the Loughborough College school in the 'fifties and 'sixties and, since the establishment of the university department, we have received over 450 students from other countries¹⁶ and are still receiving about sixty overseas students a year. About half come back with the financial aid of the British Council, which has been responsible not only for bringing students from other countries for training in Britain over the past forty years, but has also made possible British expertise in library and information education in many countries. This has included academic link schemes, the appointment of British contract staff, and expert visits. It has also included, not least, the work of permanent British Council staff in building up fine collections in British Council, and other, libraries which has provided useful collections of British books and non-book media in countries where it has not always been possible to obtain them. Moreover, the libraries have served as models of practice in countries where libraries and information services have not been equally developed and their example has encouraged professionals whose resources have been scarce, and where difficulties of implementation have been great, to apply methods appropriate to their countries, often with the advice of British Council librarians, who have also been able to draw on the Council's accumulated wisdom.

The picture is that of a very highly developed system, with seventeen library schools (plus an excellent school in Dublin, in the Republic of Ireland, making eighteen members of the Association of British Library and Information Studies Schools – ABLISS). Each of these have their individual programmes, but all in the United Kingdom are overseen by national professional associations (especially the Library Association and the Institute of Information Scientists). The programmes of the polytechnics are also approved by the Council of National Academic Awards. Many of the schools have relationships with outside bodies—British Library, British Academy, the Research Councils, government departments, trusts and foundations, industry and commerce, country seats—and with institutions in other countries. Currently examined by a national 'transbinary' committee, they face an exciting future and their future well-being will influence library and information education and practice not only in Britain, but also to some degree worldwide educational philosophy, principle and

practice in the field of library and information science.

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8.2 The Status of the Library Profession: Have We Progressed ?

MARGARET C. JONES

The progress of librarianship towards full professional status is considered, comparing some of Ranganathan's opinions with those of more recent writers. Salary scales can be indicators of professional status but librarians are not likely to be able to command levels of pay appropriate to their qualifications and responsibilities until the profession has achieved full recognition. The library profession has always been held in low esteem : some reasons for this are postulated. Librarians must cultivate an image of helpfulness and efficiency, and must learn to assert their right to stand alongside the other professions. Training needs to be altered to produce more service-oriented but also more dynamic, self-assertive staff. Publishing in the professional journals of librarianship and other disciplines would also lead to greater recognition. Lack of status is a problem which affects librarians worldwide, and it seems that little progress has been made since Ranganathan called in 1969 for librarians to take action to establish their usefulness to society.

The dictionary definition of 'status' says that it means 'position, rank; relation to others'. But how does anyone establish what their rank or position is? In the armed forces or in feudal societies it is clearly understood that a captain is superior to a sergeant, a duke higher than a peasant. In modern 'civilian' life how can we judge whether a librarian is the equal of a teacher or an actor or a roadsweeper? In an ideal world, all would be judged according to the skill and enthusiasm with which they performed their chosen career but, as librarians know only too well, this is not the case. It is society's concept of the status of any occupation that influences the sort of contribution which any individual practising that occupation can make, through his work, to education and to the community as a whole.

Ranganathan considered this question in his book "The Five Laws of Library Science"¹ and remarked that it is money which "determines the status of men as well as the value of services rendered by them." He was perhaps the first, among many, to

recommend that librarians be paid a salary commensurate with their learning and high level of service. Generations of librarians have fought a battle for higher salaries, with only partial success. Indeed, in those countries where the supply of qualified librarians has begun to outstrip the demand for them, salaries are falling in relation to those of other occupations, and make no recognition of the librarians years of training or of any degree of responsibility associated with their posts. This most unfortunate situation would imply that there is an inverse relationship between the number of qualified persons available in a profession and its status, were it not for the fact that, even when there were very few qualified librarians in existence, the level of payment was low. Amongst academic librarians this battle for an appropriate level of remuneration has become a major part of the fight for academic status—to be judged the equal of the professors and lecturers with whom they work. But as Benedict² points out, even in the United States of America where most academic librarians have attained some degree of faculty status³, they have acquired more of its responsibilities than its traditional rewards.

Money, then, is given in recognition of status (and to reinforce it) but cannot be used to establish it. Status must be proven in some other way. This can be illustrated with reference to the acting profession who are renowned for earning far more than librarians in most if not all countries. A new actor, whose talent is unknown, earns only a pittance. Once he has proved his abilities he can command a salary counted in millions. Directors will feel that he is **NEEDED** if their film or play is to be a success, and will play whatever he demands. Why is it then that even after hundreds of years, librarians have failed to convince society that their skills are needed? One reason may be that anyone who owns a collection of books thinks that he is to some extent a librarian. In general, people do not appreciate that it requires particular skills and specialised training to maintain a collection so that it can be used to maximum efficiency. They often perceive librarians as the unthinking curators of books rather than as purveyors of information, and they have no confidence that the librarian either knows or cares about the contents of those books. They also tend to forget the chaos that often overtakes the unmanned 'libraries' held by large companies or institutions, which a temporary librarian is

called in to sort out. If the chaos returns some time after that librarian's term of employment has ended, it is the librarian who is blamed and not the users who failed to follow the instructions left for them. But if the library continues to function smoothly, it is ascribed to good company management, and the librarian's name is forgotten. Ranganathan summed this up when he wrote: "The benefit of the service of the library staff, like the benefit of the service of the teacher, is not discernible at the next moment—not even in the next year or decade. Its benefit, although more universal and lasting, will come to the surface only a generation or two later, when the people, that had to open their purse and pay for it, are dead and forgotten."¹

What we, as a profession, have to do is make the benefits we offer more discernible. If we take a close look at ourselves we can see that all too often we have devised processes far too complicated for the lay public to understand—so that we can make ourselves indispensable as advisers and guides. But we are then too busy operating those complicated procedures to have time to act as advisers and guides! So we gain a public image of being unhelpful, of hindering the process of information-gathering—and of being unnecessary, easily replaced by a computer. How often has it been said that the library is dead, usually meaning that the collections of printed materials maintained by human assistants are not seen as being as efficient or as relevant to modern life as technological storage devices.

Someone who goes into a library and does not find the information or book he seeks is likely to leave saying that all libraries and librarians are useless. If he finds what he wants, he will be full of praise for the whole profession. I was both gratified and saddened to read in a London newspaper recently,⁴ a letter from a man who had written because he had received "excellent" assistance from his local public librarian. This sort of service should be the expected norm and should not be rare enough to excite comment. Librarians are judged according to the latest piece of service (or disservice?) they have offered. Birdsall⁵ refers to a study by Haug and Sussman⁶ which found that "a critical factor in improving professional prestige is the experience clients have had utilizing the services of an emerging profession; it is the client rather than the general

public that defines the professional." Thus it is the degree to which we are perceived to be helpful which determines our status

And of course Ranganathan realised this nearly twenty years ago when he wrote, in the year that Haug and Sussman published their study : "Taking . . . status by ourselves is not a simple affair. It requires the effort of establishing the usefulness of the profession to society. This really boils down to every member of the profession putting out his best service to society."⁷ Best service can no longer mean waiting in the library for clients to come in and express their wants. For one thing, they may be doubtful that the library will be able to satisfy those wants; and for another, they may not be aware of some of the latest developments in the literature of their subject. The academic or special librarian, who has a limited and well-defined group of users, needs to seek them out and tell them what is available, e.g., by compiling and distributing lists of materials newly acquired and of others recently published which will be obtained according to user demand. Sometimes this amounts almost to choosing their reading matter for them. And once they have recovered from the shock of discovering that the librarian is familiar enough with THEIR literature to make sensible suggestions, they come to appreciate and even expect the service, which furthers their work and saves them time. (Remember Ranganathan's Fourth Law : 'Save the time of the reader') Greeniaus⁸ advises hospital librarians, who wish to raise the library profile, to remain sensitive to the evolution of the hospital by establishing an effective and assertive channel of communication with the health professionals being served. For the public librarian, such a personalised service is generally not possible. It is very easy, however, to listen to the users' comments and requests, and to provide, for example, better signposting of library sections; enquiry points manned by staff whose approach to even the most trivial of queries is patient and helpful (for further comments on this, see below); and ease of access to the books. Birdsall⁹ highlights the fact that many libraries have a tendency to man enquiry points with junior, non-professional staff. Yet these staff will have received even less training in coping with clients than have professional librarians. In this the way to promote a good image ?

It is not my intention to denigrate in any way the work of

those thousands of devoted librarians who spend their professional lives striving to provide the best possible service at all times, despite circumstances that are often very unfavourable. The aim is to point out that our profession's corporate image suffers considerable damage every time even one library assistant (for most library users can see nothing to distinguish an untrained library assistant from his highly qualified colleagues) is sulky, unhelpful or rude. Our status in the eyes of the world, and the holders of the purse-strings, is not likely to improve until the word 'librarian' is associated with the highest levels of efficiency and service. And in providing 'service' it should not be necessary for librarians to undervalue themselves or be falsely humble: to offer a service is one of the most dignified and fulfilling things one human being can do for another.

Ranganathan said of status that it has to be "taken and not given by somebody else."⁷ Thus the librarian, who feels that the services he offers warrant recognition, must not be afraid to claim it. Perhaps we are a little too used too waiting in the library for customers to come and tell us what they are looking for, having a workload which is not predictable and which is dictated by the whims of other people. So we wait for status to be conferred on us as if some mediaeval king is going to come and tap his sword on our shoulders and say 'Kneel, servant of the library user; arise, Sir Library Profession'. We must assume professional status as our right and act accordingly. Doctors have to wait in a similar way for problems and enquiries to be brought to them, but never in history has there been any doubt about their prestige.

Another reason given for librarianship's lack of professional status is that it does not match up to a list of attributes drawn from the 'established' professions and used as a set of criteria. Birdsall⁸ reviews the work of sociologists and librarians who have proposed and used several such lists, and he finds that they tend to be outmoded as a means of assessment. He suggests that some of the attributes of librarianship, which may in the past have been considered unprofessional traits (e.g. that librarians are not normally in a position to prescribe to their clients), are those that will be required by the professions of the future, as clients become less willing to accept professionals as authority figures. He concludes: "Let us free our perception of

librarianship from the restricting confines of 'professional attributes'. Rather we should look to those qualities inherent to our occupation that will bring librarians and clients together."

It is a truism that the career of librarianship, unlike the more established professions, attracts people who are shy, non-assertive, and 'bookish'. Statistics suggest that others become librarians in default of something better.⁹ Both these groups of people need to learn to recognise the value of what they do, and to assert themselves and their professionalism. Hebert¹⁰ recommends an improvement in librarianship training to produce more dynamic professionals. Certainly, it is time that librarianship training included more studies on public relations (on an individual and societal basis); on self-assertiveness; and on the concept of service. This is neither a new nor original observation. As far back as 1927 the Public Libraries Committee in Britain reported to Parliament that: "Willingness to give help, patience in the face of stupidity, control of temper under provocation must be inculcated in every assistant and attendant in a library; while the higher rank need to cultivate a study of human nature which may almost claim the dignity of a special branch of psychology. The human factor is of such supreme importance in library administration that schools of librarianship and courses of instruction may well be asked to devote a portion of their attention to giving advice on this topic." (quoted by Ranganathan in 'The Five Laws of Library Science').¹¹ It would be useful also if library schools could teach their students not to undervalue the profession they were entering, but this will be difficult as long as senior library positions are filled, not by qualified librarians, but by specialists from other disciplines. It is ironic to note, as so many writers do, that libraries are regarded as institutional status symbols while librarians possess relatively low status and are therefore debarred, in some cases, from the top positions. There is some comfort to be derived from the fact that the best of these people realise their own limitations undertake some form of professional library training—following, of course, in the footsteps of that well known mathematician-turned librarian, S.R. Ranganathan. Nonetheless, one of the obstacles to attracting people who will become dynamic professionals is the very lack of status that we need them to help us overcome. It

is that elusive promise of status together with scales of pay corresponding to university academics which Khanna¹¹ reckons will serve as a motivating factor in the future recruitment of staff.

While we are waiting for these new dynamic professionals to emerge from their training, another way of 'selling' ourselves and our profession is through publication. It has been said to me that only by publishing significant studies in the major librarianship journals will be seen to have full professional status. To some extent this is probably true. But as I pointed out in an article published last year in the *Bulletin of the Indian Library Association*¹²: "This may serve to improve self-esteem and individual standing within the library profession but will have little effect on people from other disciplines who do not read those journals. A more effective answer lies in . . . learning to speak the language of those other disciplines and publishing in THEIR journals, eventually perhaps speaking at THEIR conferences." This must not be done apologetically as if our thoughts have no right to appear alongside theirs, but in the assumption that librarians have something to say that other professionals will find worth reading. Gradually then, they will come to realise that we are capable of statements other than the expected "you can have this book for three weeks" and "Sorry, but that title is not available". Perhaps they will even begin to recognise the body of learning that lies within the library profession.

The problem of lack of professional prestige is concerning librarians worldwide. A five-year search of the literature in Library and Information Science Abstracts (LISA) revealed 37 items on professional status (including academic status but excluding the status of women in libraries, which merits separate attention, and the legal status of libraries). Countries represented by those items were as follows:

Australia	1	India	4
Canada	6	Nigeria	2
Finland	1	Puerto Rico	1
France	2	United Kingdom	1
Hong Kong	3	USA	16

One of the most optimistic of these studies comes from the *Journal of the Hong Kong Library Association*, in which

Summers (13) expresses the opinion that librarianship is now showing promise of achieving recognition as a profession. It is to be hoped not only that he is right but also that recognition, when it comes, will be as widespread as the lack of status is now.

The theme of this conference is the assessment of the impact and relevance of Ranganathan's philosophy. That it is relevant to the question of the library profession is indicated by the number of times his words and ideas have been used to illustrate or reinforce the arguments that have been presented. It is almost surprising that so many of the statements of more recent writers on this topic express sentiments in accordance with his opinion that the library profession is not likely to achieve the status it deserves unless it takes what Birdsall⁵ calls the "service-oriented route". I could find only one of Ranganathan's observations on professional status with which to disagree. That is in "The Five Laws of Library Science"¹ where he states "Nowadays, nobody in the West questions the place of Librarianship among the learned professions." I regret to reply that it is frequently questioned, and sometimes denied, even today.

The impact of his philosophy on this matter is harder to assess. It is clear that a significant number of librarians have not taken advice and provided "best service to society." Neither have library authorities followed his recommendation to pay "an equitable scale of salary".⁴ Yet the fact that so many later writers and thinkers are echoing his sentiments suggests an influence—perhaps we should call it delayed impact!

It is difficult to feel that Ranganathan would not have been disappointed to see what a short way librarianship has yet advanced towards universal acceptance as a profession. Even in 1969⁷ he had to reiterate his call for librarians to establish their usefulness to society. Part of the fault may lie with a world that values showy, external symbols above the fruits of the mind; but part must be ours for allowing erroneous impressions of our abilities to persist. Some writers blame our professional associations for failing to represent librarians properly, but that is avoiding the issue: the members of these organisations are librarians, and it is their members who should be dictating the policies to be pursued. Librarians (both within and outside their professional bodies) need to make a concerted

effort to improve their public image and professional standing. Let us hope that, by the next time we meet to pay tribute to the man who was probably the greatest of all library philosophers, we are able to say, 'Yes, progress has been made'.

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8.3 Dr S.R. Ranganathan and the Study of Universe of Subjects: Its Structure and Development

C.R. KARISIDDAPPA

Ranganathan perceived the study of structure and development of Universe of Subjects. Initially he defined the basic terms such as Idea, Subject, Document, Scientific method and Spiral of Scientific method. He started with the modes of formation of subjects. Later on new set of modes of formation of subjects were brought to light by modifying the existing modes like Distillation, Fusion, Fission, Agglomeration etc.

1 INTRODUCTION

The 20th Century has marked a remarkable progress in the output of knowledge. This is due to incessant researches and extensive facilities for research by both public and private sectors. Research now-a-days is a big business which has a great currency and has become an instrumental factor for the phenomena of knowledge explosion. Libraries and Information Centres are actually facing the great challenge of selection, identification, procurement and organisation of knowledge.

There are several attempts made from time to time to organise the knowledge on the shelves of libraries systematically so as to facilitate the readers to find their need in a minimum possible time. Of all the efforts of organisation of knowledge, Dr. Ranganathan's efforts in developing a scientific and sound theoretical base has been laudable.

In this paper an attempt is being made to highlight in brief the different facets of Ranganathan's intellectual personality and his pivotal role in developing a course contents particularly, Universe of Subjects; structure and development.

2 ORIGINALITY OF DR RANGANATHAN

Ranganathan was a great thinker, master minded scholar, creator of a new era, 'An Avatar Purusha'. He brought the library professionals from the community of dust cleaners and

custodians to the level of disseminators of knowledge.

Ranganathan until his death breathed library science and talked library science. He was a man who dedicated and devoted himself, most of the time for the development of library science as a discipline and on scientific base and logical principles.

Ranganathan was a true researcher. He resembled the 'bee' which collects the honey from several flowers of various gardens, stores and makes it available to the masses. This activity is purposeful, industrious and imaginatively selective. He never resembled an ant which collects and makes use for itself of the spider which makes the cobwebs from its own resources. In nutshell, he was an embodiment of all the true qualities of a research workers, viz Poise, strong will power, devotion, dedication and perseverance.

3 UNIVERSITY OF SUBJECTS : ITS STRUCTURE & DEVELOPMENT

This subject of study was introduced by Ranganathan to M.Lib.Sc. course in the year 1968 in Delhi University. The main purpose of introducing this paper is to facilitate understanding of the complicated structure and development of the Universe of Knowledge. Library professional as a distributor of knowledge should be in a position to assess the origin, growth and component parts of a subject which in turn helps him to identify, organise and present it to the user in the form he requires.

The course contents of this subject include aspects such as :

- 1 Terminology and its standardisation
- 2 Characteristics of Universe of subjects
- 3 Scientific method and spiral of scientific method
- 4 Subjects having Universe of Knowledge as a field of study, their interrelation.
- 5 Modes of formation of subjects
- 6 Modes of thinking
- 7 Universe of knowledge as mapped in the different schemes of classification
- 8 Idea, concept formation, brain Chamber sensory experiences, etc.

Each of the above aspect mentioned in the course paper is important and together they after an understanding of structure and formation of humble.

Infact, Ranganathan was the first person to define appropriately the basic terms such as Idea, Subject, Document, Scientific Method and Spiral of Scientific Method. His intellectual and intuitive involvement in this regard resulted in the formulation of spiral of scientific method and Modes of formation of subjects. In turn, these helped in knowing the development and the structure of a subject.

How does the medical expert detect small troubles in any part of our body. It is not only learning through the books on Medical Sciences and but also in practicing by dissecting the human body, by testing, by observing the experiments and confirming the results. William Harvey founded modern Physiology by his determination "to learn and teach anatomy", not from books but from dissection, not from position of philosophers, but from fabric of nature. And also we know how the weaver is so perfect in identifying the mistake or merit in an artistically interwoven fabric he knows much about the complex assembly, rythemic knitting of each and every individual thread of all variety in a textile.

This was the way Ranganathan perceived the study of structure and development of Universe of subjects. He started with the study of modes of formation of subjects. In the initial stages, he identified the elementary modes, such as Dissection, Denudation, Loose Assemblage and Lamination. These concepts were made clear through many of his writings. The learned article by K.D. Puranik in ABGILA provides a scientific background of the study.

The team research at DRCT, under the guidance of Ranganathan brought to the light new set of modes of formation of subjects by modifying the existing modes. They are Distillation, Fision, Fussion, Agglomeration etc. This scholarly study has opened new vistas as far as organisation of knowledge minutely.

Library and information professional as a classifier, cataloguer, bibliographer, indexer, abstractor, etc., should have a scientific approach in presenting the knowledge. This calls for both intellectual ability and technical expertise. This can be achieved when the professional understands the structure and development of the universe of subjects in its broader perspective. This is what initiated Ranganathan to introduce this paper in library science curriculum.

4 CONCLUSION

Exponential growth of knowledge, with the help of the extended facilities for research at all levels, demands an intensive study of Universe of subjects; its structure and development. There is nothing untouched by Ranganathan in the field of Library Science. More than any thing, in Ranganathan works, the most important work of highest seminal level is his approach to the study of universe of subjects: its structure and development.

Through out his life Ranganathan worked for the advancement of Library and Information Science. By looking into his several contributions he can be very well ranked in the majestic line of great contributors to human knowledge.

8.4 The Unique Value of Colon Classification

D. W. LANGRIDGE

Highlights the qualities of CC and states that as a practical scheme it is superior to DC, LC or UDC. As CC has a sound theory, it gives maximum assistance in teaching fundamentals and its knowledge assists in understanding faults of other schemes. Mentions some unique qualities of CC that are expressive notation, synthetic devices, mnemonics, concepts of round and levels and fundamental categories.

Very few people outside India have sufficient experience of Colon to be fully aware of its virtues and capabilities. I don't doubt that as a practical schemes it is superior to DC, LC, or UDC but it seems most unlikely now that its use will spread beyond India. The need for a modern analytical classification in the West is being met by the new edition of BC. This does incorporate some of the fundamental principles of Colon, but is altogether more pragmatic where Colon is the embodiment of an ideal. As an introduction to the principles and practice Colon classification remains invaluable.

In any course of vocational training there must be division of responsibility between schools and the profession. Time in formal training is limited and some things are better learned by apprenticeship. In the teaching of classification, schools should concentrate on fundamental principles; the details of particular systems are most effectively acquired in use. There is no time in a librarianship course to become familiar in details with even the most well-known schemes. Any student in England may go straight from training to a library using BC, DC, LC, UDC, or any one of many special scheme. In such circumstances the choice of scheme for teaching in schools can only be based on pedagogic rather than shortterm practical value. It must be a scheme that gives the maximum assistance in the teaching of fundamentals and the inculcation of correct modes of thought and procedure. Skills thus learned can later be applied to any scheme in practice. The most widely used general schemes, DC, LC, and UDC, all have considerable faults and deficiencies. Previous knowledge of Colon can be of

great assistance in understanding the faults and in compensating for the deficiencies. In any case these schemes cannot be used to best effect without a proper theoretical understanding and this can best be acquired the concrete model of Colon. DC, LC and UDC are all without a proper theoretical foundation and even Bliss did not achieve the comprehensiveness of Ranganathan's theory. Colon has the overwhelming advantage of a simple and prominent pattern throughout. Simple, because basic subjects, fundamental categories, rounds, levels, and synthetic devices constitute the most economic formula ever devised for the analysis of subjects: prominent, because the notation is the most expressive ever used in a classification scheme. These qualities make Colon the most mnemonic scheme ever published and consequently the easiest to learn.

Subject analysis is the most important and most difficult process in classifying a document. In my experience, faulty analysis accounts for the largest proportion of students' errors and appears to be responsible for most of the mistake I have observed in libraries. Analysis depends on understanding of classification principles, not on familiarity with any particular scheme. However, in Colon, theory and execution are at one; subjects and their relationships are clearly and accurately displayed; there is a standard formula for the construction of compound subjects. In other words, classificatory principles are made manifest and the scheme itself becomes part of the classifier's analytical equipment in a way that most other schemes do not. Among general schemes only BC² is comparable in this respect, but Colon has other advantage to be detailed later.

In using enumerative schemes there is a strong tendency to select subject placings without rigorous analysis. It is difficult to do this with Colon, which does more than any other scheme to force the user into correct procedure. The crucial step of main class selection depends mainly on subject knowledge, a matter that I have discussed in another paper for this conference, but even here Colon does give assistance. Its very structure, with common categories and synthetic devices, shows clearly the recurrence of a concept in different roles and settings, thus correcting any tendency to think of concepts as belonging intrinsically to any one class. Expressing any subject analysis in a common formula is a most effective discipline

which eliminates the haziness of conception that is all too likely without it. The economy of this formula is unmatched: the concept of rounds and levels added to only five fundamental categories provides for infinite hospitality.

With this formula and the various synthetic devices the very brief schedules of Colon 6 can specify an astonishing number of subjects. In many classes this number is well beyond the capacity of the lengthy schedules in DC or LC. For practical purposes Colon 6 is now completely outclassed by the rich detail of BC², but for teaching purposes I would argue that this limitation of Colon is a positive advantage. Dense schedule are harder to use. The bareness of Colon schedules make it easy for the learner to see at a glance the scope and structure of a class. Initiation through Colon facilitate considerably the task of addressing the greater complexities of the BC² schedules.

A further advantage of Colon is to be found in its notation. The use of purely ordinal notation in BC² is understandable in view of the vast amount of detail to be specified. For learning purposes, however, the hierarchical and expressive qualities in Colon notation are a considerable help. The notation becomes a model of the subject and cannot help but facilitate classificatory thinking. In addition, alphabetical index entries can be constructed directly from the notation; a much quicker and more certain procedure than tracing the hierarchy of a subject in such dense schedules as those of BC.

The student in a library school should not begin with the detail and deficiencies of a particular scheme. This is a secondary task best carried out in practice where all local conditions and traditions can be taken into account. Learning classification should begin with the presentation of an ideal, with a thorough grounding in principles and a demonstration of how they should be applied. To achieve such aims there is nothing more than Colon Classification and the body of theory on which it is based.

8.5 Impact of Ranganathan's Philosophy in Education and Training of Library and Information Professionals in Yugoslavia

SURENDRA NATH MEHTA

The author who has been in Yugoslavia gives the situation of education and training of library and information professionals in Yugoslavia before the library tour of Yugoslavia by Dr Ranganathan in 1954. Discusses the impact of Dr Ranganathan's philosophy on library science in Yugoslavia. Describes the changes which took place in training of library and information professionals after Dr Ranganathan's tour of Yugoslavia. Describes also the establishment of the Centre for the Study of Librarianship, Documentation and Information Sciences. Gives the curriculum for the post graduate study in the Scientific field of Librarianship, Documentation and Information Science. Narrates situation at the time when Dr Ranganathan left the Library Science in India in 1972. Paper also narrates the present situation and certain changes and improvements which have undergone in the curricula and programmes for the training of library and information professionals in Yugoslavia.

1 INTRODUCTION

Ranganathan's philosophy did not remain within the four walls of India only but travelled beyond in the overseas countries. A beautiful example can be taken from Yugoslavia where the author went for higher studies in the field of Librarianship, Documentation and Information Sciences during the period November 1969 to May 1972. The example clearly illustrates the fact "Dr Ranganathan as a pioneer in education and training of library and information professionals" not only in India but also in Yugoslavia.

Yugoslavia is the ninth largest country in Europe, smaller than Italy, larger than Great Britain. It is composed of six federated socialist republics: Serbia, Croatia, Bosnia-Herzegovina, Macedonia, Slovenia, and Montenegro. Serbia consists of Serbia proper, the Autonomous Province of Vojvodina and the Autonomous Province of Kosovo-Metohia. Total population of

Yugoslavia according to 1980 estimates is 22.3 million and there we are 8 national, 425 higher education, 8411 school, 1072 special, 2101 public and 11 non-specialized libraries in Yugoslavia in 1980. To manage all these libraries Yugoslavia requires library and information professionals of various levels, *i.e.* Technical Assistants, Library Assistants, Senior Library Assistants, Librarians' Senior Librarians, Magistrates, Specialists, Professionals Assistants, Professional Counsellors, Senior Professional Associates, Scholarly Assistants, Senior Scholarly Associates, etc.

2 EDUCATION AND TRAINING OF LIBRARY AND INFORMATION PROFESSIONALS IN YUGOSLAVIA

21 Situation before Dr Ranganathan's Visit

Situation of education and training of library and information professionals in Yugoslavia before the library tour of Yugoslavia by Dr Ranganathan in 1954 was not very bright. Yugoslavia has an ancient and rich publishing, library and public activity, but the study in Library and Information Sciences has formed until very recently, only a small part of that tradition. Regular education for librarianship, as expressed in terms of library science degree programmes, did not begin until nearly the middle of the present century.

In pre-World War II Yugoslavia librarianship was underdeveloped and library education was non-existent. No or informal training existed until after World War II. Systematic training began in 1946 with a short-course programme of two semesters in the university library in Zagreb. Similar programmes and seminars were organized soon after at the other university, national and major public libraries throughout the country. These short term courses were by no means an adequate substitute for regularly organized library education on any level *i.e.* higher, middle or lower. In 1948 the training for the position of library assistant was attempted locally with the establishment of a four year secondary library school in Belgrade.

22 Visit of Dr Ranganathan to Yugoslavia

First time when Dr S.R. Ranganathan visited Yugoslavia in September 1954 in connection with FID Conference at Belgrade, and IFLA Conference at Zagreb, there was not a single University in Yugoslavia having postgraduate studies in Library

Science. But within a decade Zagreb took load in establishing postgraduate studies in Library science at the University of Zagreb, Croatia, Yugoslavia.

*23 Situation after Dr Ranganathan's Library Tour
of Yugoslavia*

Professor Bozo Tezak, a Chemical Engineer, in the University of Zagreb was greatly influenced by Dr. S R. Ranganathan's philosophy and considered Dr. Ranganathan as a pioneer in education and training of library and information professionals. Tezak in the early 1950's clearly began to regard a person working with any aspect of information as an "Information Specialist" in the broadest sense of the term and to regard a library as an information storage and retrieval system.

Due to the tour of Dr. Ranganathan in Yugoslavia the library scene completely changed in Yugoslavia. Zagreb, where Dr. Ranganathan attended the IFLA conference, took the lead in the field of education and training of library and information professionals in Yugoslavia due to the efforts of Dr. Bozo Tezak.

231 Centre for Postgraduate Study of Librarianship, Documentation and Information Sciences (CSBDIZ)

In 1961, Dr. Tezak undertook the organization and realization of the postgraduate study of special librarianship within the framework of the Faculty for Natural Sciences and Mathematics of the University of Zagreb.

With the founding of the Center for Postgraduate study in Librarianship, Documentation, and Information Sciences (CSBDIZ) in 1961, studies in Library and Information Sciences were placed along side the other branches of University post graduate study in the third level of higher education. The development of CSBDIZ brought Yugoslavia out of the traditional apprenticeship stage and into the beginnings of professional maturity, and the status of professional librarianship and standards of library education were brought to a new level.

Since 1964, this study has been known as the Centre for the Study of Librarianship, Documentation and Information Sciences (CSLDIS). At the same time it was formally recognized as an interdisciplinary postgraduate study in the joint organisation of the Faculty of Natural Sciences and Mathematics, Faculty of Electrical Engineering, Faculty of Philosophy

and Faculty of Medicine of the University of Zagreb.

In accordance with the regulations on the procedure for the acquisition of academic master degree at the PMF and employing with the Act of the High School Education, the council of the Heads of the Postgraduate Studies was in charge of approving the themes for the master thesis and for selection of the body of persons in charge of the making of the thesis. The promotion of the candidate to the master degree was performed by the Dean of the Faculty.

The postgraduate study as it was worked out founded and carried out by Bozo Tezak was, at the time of its establishment and for the few years after that, one of the first studies in this field in Europe and in the world on the whole.

In Austria, Federal Republic of Germany, Denmark, Sweden, Holland, France, Switzerland and Italy at that time (1964/65), similar to the study which was a pioneering idea of Tezak, who was greatly influenced by Dr. Ranganathan, did not exist. The only exception was Great Britain where, at the time, in 1964, begun with work the postgraduate school of Librarianship (with 23 enrolled students) in Sheffield.

At that time, as regards the high school system of education in the field of Librarianship and documentation, USA was ahead of Europe. In 1958, the Graduate school of Library Services was founded at the University of California, and the first degree of Master of Library Sciences at the University was honoured in 1961 (only five years before Zegreb).

Erik Bromberg the Librarian with U.S. Department of Interior in Portland (Oregon) and the President of the SLA Committee for Education, wrote in his article "I reached Zagreb for my lectures and conferences. To my consternation I soon learned that Dr. Tezak in 1960 has begun what is apparently the world's first two-year post graduate course producing masters degrees in library, documentation and information science. Dr. Tezak is head of the Yugoslav Library, Technical and Scientific Documentation Centre in the Faculty of Natural Sciences and Mathematics of the University of Zagreb".

In order to provide the students and their lecture with the latest information on the condition in the field of Librarianship and information sciences in the world, Bozo Tezak, organized, within the framework of the CSLDIS, the lecturers of the foreign and domestic experts and scientists.

With the aim of providing a better faster and regular information on postgraduate study the CSLDIS, begun with the publication of 'Biltan CSBDIZ' in March 1966.

Today the CSLDIS is an International Study under the auspices of the Faculty of Natural Sciences and Mathematics, Faculty of Philosophy, Faculty of Electrical Engineering and Faculty of Medicine. The present activities of the CSLDIS are limited to the postgraduate study in Librarianship, Documentation and Information Sciences.

At the beginning of 1968 a "Resolution and temporary regulations for the activities of the CSLDIS", was put forward. The resolution stated that the CSLDIS is an organization unit of the Reference Centre with the objective of :

(a) Organizing and realizing the postgraduate study in librarianship, documentation and information sciences and other forms of promotion in these fields.

(b) To organize and offer help in the organization of teaching of information - documentation sciences and techniques, principles and methods of scientific work in all aspects/education and science within the framework of the University and, according to the special agreement, also outside the Universities etc.

It was decided further that the CSLDIS was an inter faculty organizational unit of the University of Zagreb and it took over responsibility previously held by the four mentioned (Parent) faculties, but which joined also the faculties with the framework of the University of Zagreb. The CSLDIS may have an inter faculty feature. The resolution further stated : that in the execution of the objectives of the CSLDIS participates also the scientific and research council consisting of the lecturers assembly of the Faculty of Natural Sciences and Mathematics and of the members which will be elected in the scientific and research council and of the representatives of the parent faculties.

The development of CSLDIS can be attributed primarily to the foresight and efforts of one man. Professor Dr. Bozo Tezak (1907-1980) a chemical engineer, who dedicated his life to introducing and advancing the understanding and study of the "origin, collection, organization, storage, retrieval, dissemination, interpretation, integration, correlation and usage of information." The man who always admired Dr. Ranganathan's

principal contribution which lies in the fact that he established an adifice of high standards for the professional education of librarians in India. The establishment of postgraduate courses in the universities, the curriculum and the textbook for such courses, and the establishment of cadres for professional excellence were same of the other important contributions. It was because of his efforts that India took lead in establishing master's degree and Ph.D. courses in Library Science, and Professor Tezak wanted to do the same in Yugoslavia.

In order to keep abreast of (a) newer developments in librarianship, documentation and information sciences, which fields are becoming increasingly important in Yugoslavia and (b) the need for training in related professions (namely providing courses in muscology, archivistics, school librarianship and communications), major coanges have been taken place in the CSBDIZ curriculum. In 1971 separate specialized areas of concentration were established for:

- (i) Librarianship and Documentation
- (ii) Muscology
- (iii) Archivistic
- (iv) Information Science and Services

About sixty courses are evenly distributed to the above specialized areas. The present curriculum of CSBDIZ is a 2-year interdisciplinary and multi-disciplinary programme which offers two advanced degrees: "magister (apprevisted Mr.) and "specialist". The basis requirements for the magister degree in the selected area of concentration include a required number of oral and/or written course examinations, and a thesis and its defence. In addition to the core courses, a wide range of akestive courses is offered for the students in all areas of concentration. The master's thesis in considered the most important part of the study. For the degree of specialist, the number of courses is reduced (in the second year) and a 3 month practical internship is substituted for the writing and defence of the thesis.

The student body of CSBDIZ is composed of the country's librarians and documentation and information science specialists. Postgraduate students from variety of disciplines can also select courses related to their respective field of study from the CSBDIZ curriculum. As of 1981 a total of 301 students

had received a magister degree (Appendix A) which also includes two from India.

CSBDIZ represents a programme which continuously strives toward improvement and anticipation of changes in the country's information needs. CSBDIZ programme stresses preparation in scientific research and computer and information sciences in terms of its level and length of duration, the area of Librarianship and documentation can be favourably compared to the sixth-year library and information sciences programme in the United States and 2-year graduate library and information science degree programmes in the United States and Canada and is recognized equivalent to M.Phil degree in India from the respective faculty by the Ministry of Education.

For Yugoslavia, CSBDIZ is the institution which has contributed to a growing professional literature with native languages through various publications, including journals *e.g.* *Informatologia Yugoslavica* (INYU), 1969—; *Scientia Yugoslavica* (SYU), 1975—; International Referral Center for Information Handling Equipment (IRCTIH), 1271—; IRCIHE Bulletin, 1975—; teaching materials and research studies. In addition CSBDIZ functions as a nucleus of numerous library and information sciences activities by sponsoring seminars and conferences for students, its own graduates, and practicing librarians and information specialists.

232 *Bibliotekarska—Knjižarska Skola "Ivo Andrić" (Library Sciences and Book Trade School "Ivo Andrić" Belgrade*

In 1948—*srednja bibliotekarska skola* (Secondary Library Science School)—was founded in Belgrade.

The school's curriculum has been subject to numerous changes. The major change took place in 1963 when a parallel book trade section was formed.

The school's name became 'Bibliotekarska Skola i knjižarski edajski (Library Science School and Book Trade Section)

The present curriculum consists of the following areas :

(a) Specialized courses in the basics of librarianship-library activities : Organisation and administration of libraries, bibliography and documentation, history of printing and the book, history of libraries, foundations of psychology in work with readers, classification of knowledge and philosophy.

(b) Selected courses in general education : Native languages and literature, Latin, a foreign language, History of Art,

History with organization of the Socialist Federative Republic of Yugoslavia, Introduction to Economics, Mathematics, Biology, Physics, Chemistry, Geography, Physical Education, Defence & National Protection.

(c) For students specializing in book trade activities, substitute courses include: Book Trade, Production of the book. Fundamentals of Psychology in Book trade, technology of Book Trade.

In 1975, 'the Belgrade school assumed its present name Bibliotekarsks – Knjizarska Skola IVO Andric' (Library Science and Book Trade School IVC Andric'.

233 *Grupa za Bibliotakarstve (Section for Librarianship)* *Sarajevo*

A library science degree programme Grupa Za bibliotakarstve (Section for Librarianship) was founded in 1961 at the first level of higher education within the Visa Pedageska skola (Higher Pedagogic School) in sarajeve.

The programme was organized to provide training for the position of Visi Knjizncar (Senior Library Assistant) in school and small and medium-sized public libraries. It discontinued in 1969.

234 *Ljubljana*

Programme similar to sarajeve was established in 1964 in Ljubljana

235 *Rijeka*

Programme similar to sarajeve was established in Rijeka in 1965. It discontinued in 1976.

236 *Bibliotekarska Skola (Library School), Pristina*

Bibliotekarska Skela (Library School) was founded in 1967 in Pristina (Koseve).

The school was organized into two sections according to the major languages spoken : Serbe – creation and Albanian. The degree remains the same as for school in Belgrade : A certificate of completed 4 years professional secondary studies.

237 *The Interdepartmental Library Science Degree Programme with University of Sarajevo*

Another characteristic development in library education in

Yugoslavia was the founding in 1972 of the interdepartmental library science degree programme. Grupa XXXIII—Opšta Književnosti bibliotekarstva (Section XXXIII General Literature and Librarianship). This was founded at the second level of higher education (the traditional university degree programme) and organized as an integral part of the *odjeljak za opštu književnost, scensku umjetnost i bibliotekarstvo* (Department for Literature, Theatre with Dramatics and Librarianship) within the Faculty of philosophy of the University of Sarajevo.

This programme offered the students opportunities to combine studies in Librarianship with a specialization in general and comparative literature.

238 *Vojvodina*

Programmes similar to Sarajevo were established since 1976, in the teacher—training academies in Sremska Mitrovica and Novisad, both in the province of Vojvodina.

The requirements for entrance to professional training for librarianship organized at first level of higher education in Yugoslavia specify a diploma from one of the secondary schools: gymnasiums, teacher training institutions, schools of business and economics, technical schools, and the secondary library science school in Belgrade and Pristina.

These can be compared probably to the undergraduate training for librarianship organized within library schools and departments in colleges of education in USA.

239 *Odsjek Za Bibliotekarstvo i društvene—humanističku informatiku (Department of Library and Sociohumanistic Information Sciences), Zagreb*

A recent Development in Library Education at the University level is the Department of Library and Sociohumanistic information sciences, Zagreb.

In 1976 the *Katedra za bibliotekarstvo* was formed to provide students in all faculties of University with opportunities for interdisciplinary studies combining studies in library and information sciences with a specialized field.

During the summer of 1980 the programme was reorganized and planned directly within the *Filozofski fakultet* (Faculty of philosophy) as a department *odsjek Za bibliotekarstvo i društvene—humanističku informatiku* (Department of Library and Sociohumanistic Information Sciences.)

3 CONCLUSION

We have seen in the foregoing sections that there was practically no course at the University level before the visit of Dr. Ranganathan to Yugoslavia in 1954 except the one started at Belgrade in 1948. Whereas after the tour of Dr. Ranganathan and the lead taken by Professor Bozo Tezak great admirer of Dr. Ranganathan as a pioneer in education and training of library and information professionals we have at present library science, documentation and information science courses at first level, second level and third level of higher education in Yugoslavia *i.e.* study for librarianship at the first level of higher education within teacher training institutions in Pristina, Srerka Mitrovica and Nevi Sad; University studies for librarianship organizee as inter disciplinary programmes at the second level of higher education in the Universities of Sarajave and Navi Sad and postgraduate library education in the University of Belgrade and specialist and Magister in the field of Librarianship, Documentation, Information Science and Services in the University of Zagreb.

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APPENDIX

INDEX OF MASTERS OF SCIENCE (MAGISTER DEGREE)

1966	3
1967	3
1968	3
1969	4
1970	4

1971	4
1972	6
1973	4
1974	18
1975	20
1976	35
1977	36
1978	24
1979	26
1980	12
1981	99
Total	<hr/> 301 <hr/>

8.6 Structures of Knowledge, Information Transfer and Library Education

HANS STRAETER

How much special knowledge does a librarian need if he classifies documents or is using special knowledge in other fields of library work? Encyclopaedic knowledge is no longer possible. On the other hand we find the technological handling of knowledge on the basis of a smattering of the terminology. In this paper the latter is considered both ineffective and inhuman. —Library education should enable the future librarian to use special knowledge effectively. To reach this aim we think it necessary to learn structures of knowledge. Some aspects to elaborate such structures are shown. Thoughts of Ranganathan and results of theory of knowledge research are considered as well as teaching experiences at the Hamburg College of Librarianship.

1 INTRODUCTION

This paper deals with problems of learning and the acquisition of knowledge; in particular I want to raise the question how librarians who have to deal professionally with special knowledge can acquire such knowledge on a solid basis. Naturally, the main subject of a librarian's study is library and information science; the study of a special field of knowledge (psychology, medicine etc.) can only be a subsidiary subject. How can such a study be carried out most effectively?

2 SPECIAL KNOWLEDGE

By special knowledge I understand knowledge of fields (psychology, medicine etc. not of the field of library and information science. The librarian has to handle such knowledge professionally: when he classifies documents, in reference service and so on. How much special knowledge does the librarian need for these activities? Or does he need any?

I met during the last years a lot of librarians who felt unwell with only superficial knowledge of special fields. This permanent frustration may gradually lead to an 'Entfremdung' (alienation) from work. Though knowledge of the special fields he has to

deal with not only enable the librarian to improve some of his library activities but is also a necessary and humane condition of his work.

3 HOMBURG EXPERIENCES

At the Hamburg College of librarianship every student has to study one special subject, besides library science. I will shortly describe three different ways of a studying a special subject which I came to know in Hamburg.

31 *Encyclopaedic Principal*

The encyclopaedic principle is derived from European mediaeval tradition. The scholar, than had a general view over all fields of knowledge. One would scarcely believe that today people believe in such a principle. If one applies this principle to the study of special fields of knowledge it means stringing facts one after the other like beads on a string. The result of this is a shallow superficial kind of knowledge, mainly based on a smattering of the terminology.

32 *Pars-pro-toto principle*

The difficulties with the encyclopaedic principle led to the parspro-toto-principle. The idea is that some topics from a special field of knowledge should be studies thoroughly and that from the thorough study of the part understanding of the whole will arise; furthermore, it is expected that the student will learn the methods of a certain subject field. This principle we find mainly in Hamburg. It ideas to seminar topics such as : "novels of NN" or "Maria Montessori" etc. This may be a good principle for a full-time study of a subject field where the student can study a greater number of topics; however, special needs of the library and information science student are not taken into consideration. As a matter of fact, many teachers and students find this principle unsatisfactory. As far as the students are concerned the principle leads to a "culinary" selection of topics and leaves them disorientated. As a result, they have no deeper insight into a special field to knowledge and cannot see the relation to other fields.

33 *Library-oriented Principle*

The library-oriented principle is only variant of the pars-pro-toto principle. This principle results seminar topics as such as :

classification in sociology, reference service in chemistry etc. Concerning the study of a subject field everything we said about the *pars-pro-toto* principles is also valid here.

34 *The Structural Principal*

In the following I will deal with structures of knowledge and I hope that from those considerations a structural principle may be deduced which can serve as a basis for the study of a special field of knowledge.

4 STRUCTURES OF KNOWLEDGE

41 *Structure*

'Structure' means order, arrangement; a relatively stable framework constituting a system. The concept 'structure' is always related to a correlation of variable elements which represent sectors of reality. An analysis on the basis of a systematic decision about the extent and the contents of a field is necessary to make structures evident; in sociology, for example, this would be the framework of expectations, norms, attitudes, roles, groups, organisations, institutions, classes as a presupposition for social relations.¹

Our next question is : how can we make such structures evident ? For that purpose I should like to differentiate between formal structures and structures of content. Nevertheless, I am aware of the fact that—as Nelson Goodman put it—recognition of structures is to a high degree the invention of structures.

42 *Categories*

Basic forms of thought or basic conditions of thought or basic concepts could be of interest if we try to elucidate structures of knowledge. Since Aristotle such basic concepts have been called "categories" and philosophers of all times have tried to name categories and considered whether they are created by our consciousness or whether they are only perceived.

As is well known Aristotle stated ten categories : substance, quantity, quality, relation, place, time, position, state, action, affection. David Hume (1711-1776) names seven basic forms of thought calling them "relations" resemblance, identity, relations of time and space, proportion in quality or numbers, degree in any quality, contrariety, and causation.² Immanuel Kant (1724-1804) states in his table of categories twelve categories, unity, plurality, totality, reality, negation limitation,

substantiality, causality, interaction, existence, possibility, and necessity.

I do not wish to compare these different concepts which would be a very difficult and sometimes impossible task as some categories are described only very vaguely. While some categories seem to be self-evident others are very vague. At least it seems that some can claim a greater objectivity or universal validity than others, e.g. time and space. "Thus spatial relations are just as certainly prior to thought as are qualities of sensations. Judgements about spatial relationships designate something we come upon. The sets of facts they designate contain at least some features that do not first come into being through judgements but are logically independent of them, and precisely the same thing has to be said of temporal relations. The qualitative experience of the duration, simultaneity and succession of elements of consciousness is an intuitive datum that is found there in the same sense as are the elements themselves. To be judged as succession or simultaneity, the temporal relationship must be appreciated. Thus judgement always follows later, both logically and psychologically. The temporality of all processes is something given directly and intuitively that thereafter be designated by concepts and that provides the experiential foundation for any knowledge of temporal relationships."⁴

There seem to be forms or conditions of thinking, i.e. categories, which seem to be universal and common to all men. Others like causality are perhaps for many, but not for all forms of conscious perception a valid category. Other categories vary from culture to culture. Anyway, these categories are necessary to bring perceptions into relationship with a system of concepts. They serve to classify other concepts and may as well be called metaconcepts.⁵ And categories could help to elucidate formal structures.

42 Formal Structures

Categories, e.g. time space, causality, have a vast amount of contents, that is no contents at all. Therefore we distinguish contents of thinking from categories as forms or conditions of thinking.

The classification research work of Ranganathan will help us to proceed from categories to formal structures. As is well

known Ranganathan postulated five "basic categories". He was aware that from a metaphysical point of view the five categories were not imperative. "One may ask : "Why should the fundamental ideas postulated be five ? Why not three ? Why not six ? It is possible. There is absolute freedom for everybody to try it out." ⁶ Then Ranganathan describes a "descending" from the "universe of subjects" to the categories : "As we descend still further, the number of patterns appearing in the make-up of compound subjects goes on decreasing. The reduction in their number adds to the relief. Let us continue to dive towards the seminal level. Perhaps we reach the level in which the number of kinds isolate ideas appearing differently in different subjects reduces itself to ten patterns. Can we manage ten comfortably ?"

What Ranganathan describes is the increasing concreteness from categories to the "universe of subjects". It is the way from forms of thought to the contents of thinking. If the categories are applied to a special field of knowledge formal structures are made evident, e.g. in the fields of education—if we apply categories the following concepts are to be seen on a first level : process of education contents of education, people in education etc. ⁸

These concepts are the elements of formal structures, and the elements and the relationships between them build formal structures. I call them formal structures as the concepts (education etc.) are concepts of vast contents, i.e. no content at all; they serve to classify "the universe of subjects" of a special field of knowledge. The way of increasing concreteness leads from formal structures to structures of content.

43 Structures of Content

Metaphysical thinking produces categories. Metatheory of a special field of knowledge makes evident formal structures and structures of content. A dialectical relationship exists between formal structures and structures of content; although one could say that structures of content are determined by formal structures.

In pedagogics, e.g., the term "education" designates the process of education. As I mentioned above the concept "education" has a more formal nature as we can make out a vast variety of sometimes contradictory meanings. Some

authors are of the opinion that all social contacts are acts of education while others think that only certain actions can be called "education". Education is a direct or indirect influence on other people which aims at the change of attitudes of an individual or group."⁹ Other authors speak of "education" only if special educational aims are intended: "Education is the process of developing the communist consciousness and the communist attitude"¹⁰—and so on.

The way from formal structures to structures of content is a way of differentiation. First applications of categories in a special field of knowledge elucidate its formal structures. Elements of these structures are broader concepts with a vast contents of meaning. They are very vague.

There is a gradual transition from formal structures of content.

The working out of structures of content in a certain subject field is not an easy task. Obviously different people will achieve different results. If structures of reality are depicted as structures of knowledge no absolute objectivity can be expected. Though a higher degree of objectivity will be achieved by the application of categories cultural and social influences—as I have already pointed out—will become effective. Science is always a product of social practise.¹¹ "Theory is a coherence of recognitions which result from a certain practise and certain objectives. He who looks upon the world under a uniform point of view will see a uniform image...Practise organises the material which everyone notices and ..in the given facts subjective moments will become effective."¹²

5 CONCLUSION

The structural principle seems suitable for the librarian's study of a special subject field. The application of the structural principle means :

- (i) to decide which categories are relevant for a certain subject field,
- (ii) to differentiate these categories according to the needer of the subject field,
- (iii) to elaborate the formal structures of that field,
- (iv) to elaborate the structures of content.

At the first stage of elaboration classification systems may be helpful which provide categorical division.

As a result of such a study the librarian should have gained a general view of a special field of knowledge and, secondly be able to transfer structures from one field to others, e.g. from education to other fields of the social sciences. There are no examples of the elaboration of structures of content of a whole subject field. In this paper, too, only some hints have been given for the elaboration of those structures.

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8.7 Dr. Shiyali Ramamritan Ranganathan: The Teacher *Par* Excellence

C. V. SUBBA RAO

A bibliographical article that tries to evaluate Dr. Ranganathan as a teacher, mostly concentrating on 1962-1967 period of DRTC. Views teachers' training playing a prominent role and leading a firm way to excellence, in combination with the National struggle for Independence. Ranganathan as teacher at DRTC is seen to be innovative to forge new techniques to help industrialisation of India. The qualities of question-answer method, the class-room's charged atmosphere when extending the confines of knowledge, the colloquias' difficulty and value, collaboration in writing papers, and the aspect of precision in expressing are viewed in a live-context. While being innovative, in patterning the syllabus for DRTC, the haste and the lack of time, sent much of the efforts over the heads, as viewed in the grasp of CC and CCC, the first being saved by extension lectures of Prof Bimal Guha. Highlights the lack of text books for "Universe of knowledge" (Subjects) and 'Depth classification' and implications there of for students, illustrated through an incident. He also craved for deeper understanding with his students. The concepts of '*Gurukūla*' like *Antevasi* (Living together), relevance of oriental epics, morning walks, reform of examination system, the seminar as a practical experimentation of teaching, are gone into. IASLIC's Seminar Technique is viewed as an alternate method, where multiple schools of thought could meet without the procedures chaining discussion. Views that impatience and eagerness for recognition by other disciplines marred Ranganathan's formal research guidance. In short, describes an idealistic and achievement oriented lifespan.

"Chapter first and Intellect next" is a concept deeply embedded in Dr S.R Ranganathan (1892-1972). He exemplified this concept and made a touch stone of it. While running through the aspects of teacher *par* excellence, other personal qualities seep their glow and gleam and give the shade effect to the drawing.

1 REALITY UNDISTORTED

To be truthful the effort is not a ponygaric. If truth is not stuck to, the beauty of the portrayal loses the spring board

of excellence and permanance and turns out to be sycophantic Sycophancy to a person "no-more" smudges the author's reputation, and renders disservice to the biographee, for the 'real' man who trudged on the rough road of life, would be portrayed as crossing the Himalayan peaks on a Boeing, drained of all valour and struggle. How the bridges are crossed, how the 'fall' is saved, and how "will" drove on, are more interesting and real.

11 Controversial

The portrayal belongs to 1962/63, a little earlier to his lectures in 1962 and letters of 1960. In the earlier period he was a legend, for he was much talked about. In fact, the period 1933 to 1972 had hotly debated Ranganathan a set of pupils extolling and another set of disgruntled students joining the contemporaries who thought that they never seen the 'light' to criticise bitterly, to add to the seamy side.

2 BASE OF TEACHERS TRAINING

From the early 1920 to 1950, to become a teacher, even at college level, teachers training was essential. After Ranganathan's unsuccessful bid as a Mathematician at BA (Hons) from the Madras Christian College, which he just passed, though he had a brilliant record in SSLC (Matric) and Intermediate, securing ranking position at the state level in the Madras Province, he joined Teacher Training College (Licenciate in Teaching=LT) at Saidapet, Madras.

21 Objective of Teaching

The orthodoxy in the Madras Provinces to insist on a LT/BEed for a teacher at college level points to the requirement excellence in teaching those days. The subject expertise, teaching techniques were added to qualification, even at college or research levels Teaching is not mere eloquence, and felicity of expression in the medium-language of instruction, of subject expertise at research level. The object of teaching was to unreach the mental faculties of students, train them and approach the subject detail from different angles and utilise different methods, so that, that part of the subject sinks into the mental culture of the students. Not only that. The brilliant/intelligent student understands quickly. The backward pupils are to be identified and the subject repeated, retaught by

changing methods, approaches, and techniques, till the last pupil of the class is made to understand.

22 Inspiring Instinct

In the early days of the Independence movement in India, there was a great spur in academic, political and social activities. The teachers dreamt of an Independent India. Their fields of operation being teaching, they put extra-ordinary efforts to raise excellence. Ranganathan proved the soul-stirring inspiration by his dedicated contributions, not career oriented but pursuing excellence, permanance, principles, building talent around, researching, teaching, publishing, and lecturing. Even in bed, while eating, on a train journey, at the airport, on the railway platform, and in morning walks, he discussed the lived Library Science. He was a professor at large, with a large heart too. A symbolisation of a dedicated teacher, where retirement meant freeing from responsibilities of a 'chair'; and 'death' alone is real retirement.

3 THE START IN MATHEMATICS

After being an MA and LT he joined in 1919/20 the Madras Educational Service as an Assistant Lecturer in Mathematics at Mangalore. 'Dedication' and 'India' have ignited his soul. He started a strange and innovative journey from the very beginning.

31 Mathematical Sense

Having understood Mathematics at the core principle level, he began building up a Mathematical sense in his intermediate students. The students took to it, but parents got worried. After a term, the parents represented to the Principal, how their sons were talking strangely and unfamiliarly. Ranganathan fortunately had Prof Ananda Rao as Principal, himself a Mathematician. When Ranganathan explained his method, Prof Ananda Rao was convinced and asked him to carry on. The principal assured the parents that good will come out of such a teaching but in his heart of hearts he was fidgety if the method does not prove a success. Ranganathan was full of confidence and reassured some more enquiries from the Principal. Perhaps it should be something like 'New Mathematics' of the present time.

32 Teacher Vindicated

At the end of the year, when the examination was over, Ranganathan students declared that they have cleared the paper. May, they criticised the paper setter, for not setting questions on some vital aspects of Mathematics. When the results were announced, all the students passed. Around 90% of students got 100% or more marks, others got I class. Thus, an extraordinary teacher stepped out of his first year test of fire.

4 MOVING A PAPER

His career took him to Madras. He produced 5/6 papers in Mathematics which he used to term as 'thin' contribution. His first seminar is memorable. In the early stages of his career, he had a stammer. His name was called to speak. He mounted the dias closed his eyes to avoid the fear of rows and rows of heads in the big hall. He spoke out what he had rehearsed, heart thumping within. He ended the speech and came down the dias. He heard the applause. He was so nervous that he did not know that was going on. Some people congratulated him. From a far in the hall, few could see his closed eyes and shivering limbs. Such is the beginning of the researcher in Ranganathan the future master of expression.

5 LIBRARY SCIENCE TEACHER

In 1924, he joined as Librarian of the Madras University. On behalf of the Madras Library Association, he started Library Science classes for certificate course. He used to teach Colon Classification along with DC and Comparative Catalogue Codes examining CCC and ALA. His students who stepped out had the 'new Messiah' in them, besides veneration for the teacher. When no Indian Library Science school was firmly founded, his courage and innovativeness and consistent research gave life to the subject and inspired students with their "new found knowledge." The students of Ranganathan maintained their contact almost every year wrote to him to clear doubts and contributed papers to seminars. In his entire career, Ranganathan did not disappoint his students in encouraging to do research. The students, after settling in their careers, disappointed him largely by marching backwards mastering

the ropes that advance careers, utmost maintained nominal library services or in general were out-paced in research and were left far behind. As a teacher, he kept a mental evaluation of his students, their potential, paths they followed, and the consequent appraisal. Agreement or disagreement is beside the point. He was not a teacher confined to the class room. Entire career is a continuing education, research and service-oriented. He sustained interest in his pupils, till the end. Never the letter was left unanswered. He detected struggles and was always a beam of hope when dark forces tried to engulf the solitary struggling soul, whether his student or not.

51 Phases of Teaching

The students of 1940's should have found Ranganathan's highly innovative in teaching with speed, he revised his CC and CCC. Students in 1950's should have seen a maturing vintage of excellence in his teaching. By 1960's, the warrior or many battles was planning how to forge a link between industrial growth and information organisation in India, which is the origin of DRTC at Bangalore.

511 Last Stage

From 1962/66 onwards, he taught with dwindling direct participation. Afterwards, he was available for consultation and research, not for class room teaching. It was a great effort for him to walk DRTC, hardly 100 yards away. Being a student during 1962/63, the portrayal could be of this last decade or quinquennium of his teaching.

6 DRTC—1962/63

61 Extending Frontiers

Ranganathan taught "Universe of Knowledge" "Depth Classification", and "Cataloguing" for the 1st batch of students of DRTC in 1962/63. He followed the question-answer method in teaching^{1,2} i.e. preparing the minds of the student to receive new knowledge, after his knowing the existing knowledge-content of students. He was although playful, but leading the students to to precision. If a solution is given, he will pose a problems to a student and watch the psychological struggle and other students' attitude to the struggle. It always used to be the spot

where books have ended and the students extending their thoughts, beyond the present confines. Even after research, finding the new relation new pattern or new condition, precision in expression with confidence is difficult. In the classroom, to be asked suddenly to step out the present confines of knowledge and identify the solutions, is an intellectual challenge to which Ranganathan repeatedly exposed the students. At times, he allowed the students to take the wrong road, to show that it is blocked and so to retrace to the junction point. When struggle to express an idea used to ensure, he would advance word by word, using the black-board, group it and name the concept. The consonance of the extraordinary coalescing of concepts with words (terms) used to send a thrill down the spine. And then, within a week, the students will be asked to write on it or talk on it before professionals in a colloquium.

62 Exposure of New Thought

The second challenge is almost an artist's exposure or nudity. In his classroom, the student had a friend who helped. In a colloquium, before the experienced professionals of Bangalore the young minds are exposing 'youngest' thought or handling a just born baby. Ranganathan and other professionals would cut the students to pieces. The students had to stand up and defend. Week after week they were exposed mercilessly in the name of colloquia.^{1 13} Gita was "real" before them. They wanted to throw away their bows and arrows leave the chariot and run ill their reached home, never looking back. Like Lord Krishna, Ranganathan was at the chariot-reins. He helps the students, built up the theory, at a near-tear-stage of the 'Leader'. But what they did not know as students was, that except for Ranganathan and one or two teachers of DRTC, no body knew of what they talked. The problem was thought coherence and littleness before him. The other professionals pricked here and there, but they did not understand the totally new concept. Thus the students were taken to the battle field, almost were vanquished, bnt were victory smiles when professionals congratulated them on evolving the new idea, so difficult to project and express.

63 Writing New Thought

The above true psychological, battle-worsted state, cast aspersions on the young author's ability to write, a paper or a

technical note. Ranganathan took the attitude of a research guide and carried the younger mind as joint author. At times, a little more competence in thought would even make Ranganathan a collaborator and the second author. All the Library Science periodicals edited by Ranganathan followed a typical style of rendering. Descriptive, fluffy, fluttering type of articles are alien. Scientific, well defined, almost digging the concept from the first sentence to the last, is his model. So he moulded the language of the thought, after the ideas were thus hammered to shape.

631 *The Peers*

What is forgotten by critics is that the students did question Ranganathan concepts by citing practices, consequences etc. As the author who wrote on the problem earlier, he took certain things for granted. When he saw reason in the question a repatterning of the problem, restatement, a more enduring solution used to evolve. But to the wavering confidence of students, it was extraordinary that the criticism went home. For Ranganathan going slow in teaching on a previously researched problem, exposed the assumptions of the author, and shattered the prejudices, which lead to greater clarity, which carry the findings of the idea plane to the verbal plane. He gratefully acknowledged such contributions. For, who would expose his concepts, at such a depth, with such motiveless criticism, born out of the spirit of investigation. He called his students his "peers". The students laughed then, unable to believe.

632 *International Gatherings*

It is true Ranganathan could not be understood fully in International gatherings, because of language barrier, terminology barrier, and also concept barrier. All cumulated, the Western criticism that he was mathematical or philosophical, was never near the reality, except that he was not understood. His students at later stages understood him and could render healthy criticism. Thus the real peers were his students during their studenthood. They heard the victory bugles, raised a toast in combradery.

64 *Best Teaching of "UK"*

'Universe of knowledge' got the best in Ranganathan. It was a

totally new realm, with 'Spiral of Scientific Methods', "Dynamic turbulent continuum" and "Growth of Subjects". After critical drilling, marching forward and discussion, back was at in for almost 45 minutes to an hour, Ranganathan used to charge forward for half-an-hour. It was a treat. With extraordinary vocabulary control, precision in expression, he unfolded the research findings when his expression touched an unplanned exploration in the discourse then the expressions danced to the new celestial tune, indicated by his left eyelid performing a frog-leap forward. The author could identify around half a-dozen such occasions and he was extremely happy to find one who noticed excellence. For a delectable performer, an informed '*rasika*' is like wine's forth, enjoyable to inexplicable depths.

65 Depth Classification

One of the objectives of DRTC was to meet the criticism that colon classification was Macro in nature, whereas research subjects were micro and industry and technology which have applied research aspects and interdisciplinary, could not be managed by faceted analytico-synthetic scheme of Colon model. Earlier at Delhi University, Ranganathan helped Dr D. B. Krishnarao work for Ph.D. on a depth schedule in Agriculture. Methodology was known to him but not explicitly stated. DRTC was forged to meet this challenge of depth classification and indexing problems.

651 Course Repatterned

To analyse a subject at depth and formulate a subject schedule, Ranganathan experimented in taking Master degree holders in science and social sciences, even without a primary degree in Library Science. He abridged subjects like cataloguing and administration and went into details of depth classification, Universe of subjects, and documentation, to pitchfork an M.A /M.Sc. to a straight M.Lib.Sc. level, in an year's time. Students perforce had to work like devils and had little leisure. But teaching needs time for absorption, which was lacking. At least 25% of knowledge taught went over the heads, for the students were too tried to absorb.

6511 Weak Foundation: Colon Classification in its Macro aspect was taught in extraordinary haste, assuming absorption. By half-year exams, even the teachers were worried what the

students performance would be, if the levels of mastery of CC did not significantly improve. At the time the students were collecting around 1000 documents; finding isolates for a Depth Classification scheme. Fortunately, Prof. Bimalendu Guha came from Insdoc to give a course of lectures, and he initiated us to Colon, without much clutter of the theory. Thus, there are students giving long discourses on CC or CCC, but practically at sea when confronted to classify Prof Guha saved the students from the calamity in his brief 20 days stay. The event helped to build on the knowledge of formulating special classification schemes, for which documents and isolate terms were already selected.

6512 Why the defect ? What is important is that the teacher for Depth Classification did not succeed to give the students the ability to classify by Colon system. But the students could follow higher reaches of thought. A fortuitous event helped. The reasons could be that Ranganathan was in great haste to prove the experiment of DRTC a success. For him CC was something assumed, on which he was building new structures. By pruning the one year course syllabus of Dip Lip Sc (equivalent to B.Lib.Sc.) and adding Universe of Knowledge (subjects), Depth classification, and Documentation, he thought that one year was enough. The students all belonged to the age group of 25-35, being in the first decade of service. 'Literature Review' was to be after the academic course, during service, but within 6 months, to obtain Associateship. By not going slow, not having allotted the time span for classification, the defect resulted.

6513 Practical Subjects need classroom. Morning walks were designed to be "free for all"—system of questioning, surprising opinions etc. Ranganathan used to utilise the device to go slow and fill in the blanks, which he thought he missed. While they did Yeoman's good, practical subjects cannot be covered in morning walks.

66 Hasty Teaching—Cataloguing

As narrated earlier about the defect in teaching of depth Classification, there was also problem relating to cataloguing which Ranganathan taught. The auther joined around 20 days late, wher the CCC was introduced. Classmates were less enlightening.

Unlike other cataloguing codes, CCC cannot be read through. Like a legal code, different rules of different sections have to be grouped and the doubt cleared at any time. As misfortune would have it, no Bimal Guha was around. By efforts the students got through, but surely not mastered CCC as a code. Again lengthily theorising should not be mistaken to be mastery. The ability to 'do', the last test of utility of knowledge to perfection ever remained a dream. There could be situations that produce imperfect students under expert teachers. At the same time, enough attention not being paid by teachers on this aspect, was evident

67 Even Spread Concept

Ranganathan could not understand how a student can fail in a subject, while scoring high in other papers. For example, a student cannot score 25% in cataloguing, while maintaining a score of 60% or above in all the other papers. At the Banaras Hindu University when this happened he attributed it to the unrelenting prejudice of the teacher and got the paper revaluated who scored nearly 60% in the revaluation. He thus set a model as a member of Board of Studies in evaluating student's performance.

7 LACK OF TEXT BOOK

On Universe of Knowledge, Ranganathan teaching took the students to new realms. The students fondly looked forward to them. The concepts taught were totally new, pieced together from many sources and an integrating theory developed. No single book could act as a guide, not even a set of books. To build up curriculum knowledge through scattered Reference material is good exercise but draws to the lack of a textbook. Such a situation exposes the students to consequences that are without remedy.

71 Situation of Conflict

There can be no examiner from outside, as the subject was not taught by many in India or abroad. Ranganathan was a pioneer, unparalleled. Were he to take into his head to fail a student, which authority in the universe, would point to the injustice? Once there was a misunderstanding between Ranganathan and the author. As there is no appellate channel open, whoever

might be in the wrong, the loser is the weaker partner. Hence it is better to leave the course, than be failed, because of personal dislikes. But that was also the moment when the author tasted the Love that Ranganathan contained within his heart. Cackling, Joking, talking to student etc were in-drawn and silent. He did not even look up in the class room. Even when called to Ranganathan's room, he kept a distance, physically and mentally. The thoughts of ending the tenure in the course were uppermost, but unexpressed. Then fell Manna.

72 Reconciliation

He asked the author to meet him after the class. He put a friendly hand on my shoulder and said "why are you so reserved ? Do I deserve it ?"

CVS : No, Sir, where are you, and where am I ? How can that distance go ?

SRR : I am not speaking of that. Even then you are all my peers Who understands me, except you here. That is why, I cannot bear a misunderstanding. (Here 'You' meant the DRTC class).

CVS : Sir, I told you in all honesty, openly, lest you be missed on constitutionalities. But you mistook me.

SRR : No. I know you are helping me so that derisive talk would not be behind me. But I cannot bear any more, if even Subbarao misunderstands me."

721 Smiles

When saying thus, Ranganathan was not arguing, but speaking his heart out, craving friendliness. When I knew that he understood me, I broke into smiles and assured him, that with such deeper understanding, I should be forgiven for my misunderstanding. Dr SRR invited me to have lunch with him, but I politely refused and ran to the mess, not to be too late.

73 Understanding Tried Again

Similarly on another occasion, when I took a complaint to him, he scolded the wrong-doer and me, in equal measure. Even with deeper understanding, I felt slightly hurt, but kept my silence, to give him my mind, that if that be his attitude, no more complaints would come to him, no matter whoever be in the wrong.

731 *Drama Unveiled*

Soon after the scolding session, when the guilty departed he commended on my silence and not bursting out. "I was scolding you, only to keep the scales even, lest the other charge that he alone is found guilty, I am glad you understand me". But I did tell that had it not been for the immediate clarification, though I could understand the 'drama', I felt bad to be scolded, having done no wrong.

8 GURUKULA

His Teaching was a close approximation to *Gurukula* system. "*Antejwasi*" was very much emphasised, i.e. living together, share life and knowledge in company. There should be no fear, no distance, but intimacy and rapport in thoughts. Why should there be a classroom to teach? Wherever teaching occurs that turns to be the classroom. Students should have the liberty to talk about their doubts or new thoughts to the teachers at any time.

81 *Togetherness*

Similarly teachers are to tell students any new thought of their by assembling all the available students. Again, there should be interaction among teachers, so that subject expertise crosses compartmentalisation and all participate evenly in any discussion. It is a universe of thought directed to a subject of study, by those interested, in collaboration of seniors, living together for a period.

82 *Related to Epics*

To this concept he added the rich lore of Ramayana, Mahabharata and Gita. Being a mathematician, well versed in Indian Philosophy, inventor of a system of Classification, pioneering researcher himself, and intimately drawn to the students, are a rare boon that can happen. The familiar examples, like *Hanuman* looking at Lanka, is equated with students look at⁹ subject from after, and how to make way while amidst. To a student, this oriental teacher in Ranganathan gave confidence, that India could regain its eminence in all fields by following the path of *Vedas* and *Upanishads*. After all, most knowledge is evolution of basic concepts, and develops an attitude and a culture of vision. His personnel example was a

rare model.

9 SOME DIFFERENCES

In the morning walks, during intermittent discussions, almost for a duration of 3 months, 'Seminar Technique'—was perfected with never ending differences and some principled compromises. Another aspect about which the author am still to be convinced is : "Given technical terminology and a scientific new fact there is—one and only one way to state it," Contended Ranganathan. The author contended all through the year, that the audience, the purpose and the style of expression, and variants, scientific fact and technical terminology remain the same. Till today the positions are honestly held, not knowing what is right and what is wrong.

10 FEEDBACK : ASSIGNMENT SYSTEM OF EVALUATION

For the first three years, the students of DRTC got a confidential questionnaire to evaluate the course and to point out corrections and gaps. Two significant results took place. The first, to admit only Bachelor Degree holders in library science to avoid drop-outs during the course and desertions soon after, but largely Master's Degree in a subject was held on to. The second reform is to replace examinations by a system of self chosen assignments to be completed during the course, the evaluation of which enables the students to obtain Association of DRTC. To breakaway from the Examination System to a self chosen Assignment System by the later half of 60's, needed a Ranganathan at the helm. No lesser authority with any less reputation could attempt: and if attempt be made, the professional acceptance would not have come. Ranganathan was heralding a future system of educational evaluation in India.

11 ANNUAL SEMINARS

The educational curriculum of DRTC has an Annual Seminar in-built into the system. The students learn after their experiments of colloquia, through a practical national demonstration. The rules of the game are meticulously followed, the deep digging papers giving the backdrop. Precision in expression,

identification of a problem and drilling from many angles to find solution, are a demonstration of Science and Logic. The students almost constitute the Reception Committee, and are in-charge of the secretariat work. The participants are divided into groups of 10 or 15 with rotating chairmanship (a senior Professional) and one of the current students acting as Rapporteur. The Resolution slips are collected every hour from the groups and transferred to the stencil immediately, so that by the time the delegates depart, they have the controversial resolutions, in hand, or latest at the rooms. In the plenary sessions, the audience is divided into two halves, each half facing the other. Each group moves its resolutions and a clash of views ensues, settling for the best of wisdom. DRTC Seminars are looked upto for research results, and young professionals are eager to get trained in 'no nonsense' discussion methodology. With the Sarada Ranganathan Endowment Lectures by an Internationally eminent Professional thrown into the programme, to occupy each evening, during the Annual seminars, the supply line of knowledge works from 9 AM to 6 PM on each day of the Seminar.

111 Iaslic's Seminar Technique

There is criticism of the Seminar System of Ranganathan. It allows only one school of thought, poured in a particular mould, making it difficult for the uninitiated professionals to enter. They watch as bystanders, understanding intricacies less and less, and the feeble attempts to enter discussion thwarted by procedures. To create an alternative, a different seminar technique was experimented for IASLIC between 1964 to 1970. The seminar papers are studied deep, the agenda and resolutions are worked out on the strength of the papers, the discussion goes from proposition to proposition, 'for' and 'against' alternating, and the results are real consensus, taking nobody at a disadvantage. The delegates participate actively till the end. The group system of discussion could not be implemented. By far the second best procedure is practically evolved by IASLIC, which is the best consensus mode so far. The research is not organised, but flows in from all corners of India, the procedures have not thwarted participation, the idea or theme is considered more important, and even a defectively expressed idea is given life to, at any stage in discussion. Papers are published ahead, abstracts are distributed, and the delegates

represent the mass of the profession. If IASLIC could initiate a few research programmes and group discussion methods the results could be very good.

12 RESEARCH IN EXAMINATION CONTEXT

If the students personality is unrevelled during classroom teaching, the natural end that is reached is research. Self chosen, planned reading, consultation with guide, a few 'discussion papers' and seminars, publication of half-way-house the final thesis are a neat procedure. But in the context of examination oriented research, and the peculiar Indian path, research takes many shapes.

121 *Service Oriented Research*

If examination oriented degree is exposed to a life situation in a subject field through library service, and that is taken seriously in a five year term a research project is surely to emerge. Research of such a type could be termed service oriented research. A second variety is theory oriented research, for which examination oriented degrees most ill-suited. Unable to play with ideas, the researcher plays subservient to the guide and is an obvious unequal relationship. Especially in a young subject like Library Science, where the base is not deep enough, research is playing in the air without a platform. The research guide acts as the extended platform. in the present case Ranganathan. Without that support there could be no successful research. Unfortunately service oriented research did not come up, and was not encouraged in India. Thus the only doctorate produced in India during Ranganathan's life time, was Dr D.B. Krishnarao on the Depth Schedule in Agricultural. Having so much of theory oriented research behind he also preferred that type. The few who dared to work on could have been too slow, nor did Ranganathan had enough life left to take them to doctorates, *as their speed*. A few research papers resulted. Mostly the gap in levels of knowledge, created a strain and an abrasive eruption of ego, which cut the research effort asunder. Ranganathan being a pioneering research could spot potential persons, but could not weave out a successful patterns leading to Ph.D. Even DRTC. after Ranganathan is perhaps at the spot where he left it.

13 RANGANATHAN'S RICH HEART

Even today, if any service librarian talks of research, derisive laughter greets him. With so many facilities around, the library profession in general is not oriented to research. The struggles of Ranganathan when the subject was not yet identified, in that milieu of colonial governance could best be imagined. He was lucky that he was understood, opportunities came his way, and largely his achievements stood out.

131 *Savings*

He was frugal and austere. He saved from his salary, as he neither gave parties nor attended any. Full time professorship in library Science, perhaps he aspired for. No university touched the suggestion. From his savings, he donated in 1956 one hundred thousands ruppees for the "Sarada Ranganathan chair "in library science". to the Madras University. It is the first fulltime Professor's chair in library science in India. The whole profession of librarians rose to up as one man to hail such idealism in Ranganathan. The last mark of an ideal teacher—to stabilise the new subject institutionally, he made over his own savings. Thus, the miser became a philanthropist.

132 *National Research Professor*

The Government of India, at long last, made Ranganathan a National Research Professor in 1965, a rare honour, hitherto, the practice was to institute professorship in subjects like Economics, History etc. True to the spirit Ranganathan shared it with the profession, as no honour left even a feather touch on his conduct.

14 CONCLUSION

Ranganathan exhibited streaks of genuine in teaching, even at the very start of his career at Mangalore. Library service, research and teaching formed a holistic part of his personality. Bold plans to equip India's industrial growth through the establishment of documentation, depth classification, indexing and scheduling, etc took the shape of DRTC. Question-answer method, assignments, colloquia, morning walks, impromptu classes formed a well planned out teaching system. The reform of examination system and life long attempt to give shape to research, mark out Ranganathan career. The seminars, the participation, planning of Sarada Ranganathan Lectures as a

part of the seminar, group discussion methodology to the point of seating arrangements, etc. show what a close approximation of a complete teacher he was.

141 Ranganathan Concludes Postscript

As if to confirm the suppositions behind the theory of teaching excellence being due to the teachers' training, it is a pleasure to quote Ranganathan himself in the most conclusive way."⁷ Overall effect.

Generally speaking, the method of teaching used was not very helpful. It was largely lecture method at a great speed. The teachers were practising librarians who had never undergone any training in teaching technique or in educational psychology. But some of the teachers who had known that his students had been already teacher for seven years and had undergone a degree course in teaching—would spend some time with them at the end of a class and discuss with them how the teaching could have been done better. This post-mortem examination was of immense interest to the teacher trained students as they were interested in teaching technique. Later on, when they began to teach Library Science, this discussion after the class with some teachers was found to be of help.

(Source : Herald of Library Science, 2 No. 4; 1963 October, p. 210. Ranganathan (SR) A Librarian Look Back Article ZL).

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SECTION 9

INFORMATION TECHNOLOGY

9.1 Information Technology: Its Impact on Information Users

J.A. LARGE

Information technology is capable of improving access to information, but it can also restrict users' freedom to exploit what should be a common resource. The introduction of computerised information services may result in a policy of charging users for information; computerisation may also concentrate information in the hands of a powerful few against the interests of the many; finally computerised databases may not be equally accessible to peoples of all countries. This paper examines the impact of information technology in the light of Ranganathan's belief in a library service based upon users' wants and needs.

THE ROLE OF INFORMATION TECHNOLOGY

Recent developments in the use of computers for the storage and retrieval of information, and in the use of telecommunication networks and packet switching services to transmit data over long distances between computers, now offer exciting possibilities to improve information services. When Ranganathan first formulated his Five Laws he could not have foreseen these dramatic technological breakthroughs. Yet he was intensely concerned about exploiting to their maximum information resources for the individual and common good. Would he have welcomed the opportunities which information technology offer in the last decades of the twentieth century, or would he have expressed some concern at the uses to which information technology might be put?

During the last thirty years computers have become more compact, more powerful and cheaper to purchase and maintain. The first fully automatic computer, ENIAC (Electronic Numerical Integrator and Computer), which became operational in 1946, weighed 30 tons, contained 18,000 valves and diodes and occupied 1500 feet of floor space. Such monsters, of course, are now as extinct as the dinosaur. Very large quantities of information can be stored on magnetic disc, and discrete items can be located and retrieved at high speed. Developments in micro-technology—especially the mass production of silicon chips containing integrated circuits, and hard disc backing stores—enable relatively inexpensive microcomputers to be used for many library-related purposes. All the logic circuits and memory capacity of ENIAC could now be held on transistorised electronic circuitry on a chip no bigger than one square inch.¹ In-house databases can be created either from local records or by downloading records from external databases to a microcomputer supplied with suitable software to configure the data into a local database. Microcomputers, like their large cousins, can now be linked together in networks, facilitating multi-user access. Enormous quantities of bibliographic data are now accessible to any library which possesses a computer terminal or a computer with terminal emulation software. One such database, BIOSIS PREVIEWS alone contains over 4 million records from 1969 to the present, and adds around 30,000 new records each month. These records can be retrieved online from vendors such as DIALOG Retrieval Services in California or the European Space Agency Information Retrieval Services (ESA/IRS) in Italy, both of which offer direct access to millions of records on dozens of databases.

Not only bibliographic records are available online. Non-bibliographic databases are proliferating, offering access directly to information rather than to bibliographic surrogates. Numerical data—in particular economic and demographic statistics—are widely available online. Given suitable software, such numerical data is not only searchable but can be manipulated online to provide analyses, forecasts, modelling, and so on. Full-text databases now provide online access to a growing number of journals and reference works; DIALOG offers such files as the *Academic encyclopedia* and *Everyman's encyclopedia*; Mead Data Central, an early entrant in this field, provides a widely-used full text legal database, LEXIS (although

LEXIS is primarily aimed at the lawyer and not the librarian).

Electronic journals, such as Learned Information's *Electronic magazine*, can now by-pass print technology.² Raw news items are assembled by contributors on word processors and then submitted online to a parking file on the Direct Data System of ESA in Frascati, from where they can be down loaded to the journal's editorial centre in Oxford, U.K. Edited copy is then batch uploaded back to the ESA computer from where it is available online. Articles can be read online, printed online or downloaded to an in-house micro computer for later consultation offline. To simplify use by those unfamiliar with the ESA QUEST retrieval software, a menu-driven search system can be employed by the reader rather than the QUEST command language. Publishers are also investigating electronic document delivery systems. Articles would be stored cheaply and compactly on video discs; retrospective searching could be made online and retrieved articles then transmitted from a central video disc bank online to the requester's address.

Another form of online access to information is offered by videotex systems, of which the British PRESTEL service was the forerunner. Information, often of a general rather than a specialised kind, can be found by using a modified television set and telephone. Local information services for particular localities are offered on PRESTEL, and it is possible to order goods online from certain suppliers, payment being made by credit card. PRESTEL also offers a 'gateway' into other computer systems, such as those operated by some commercial banks. The French equivalent, Minitel, is even intended to replace the printed telephone book, and will ultimately give access to a new Mediatheque at the National Museum for Science, Technology and Industry, due to open in Paris in 1986.³

Within the library, users may now access a catalogue of holdings online rather than via a card or microform catalogue. Such an Online Public Access Catalogue (OPAC) informs the reader not only whether a book is in the library's stock, but also whether it is currently on loan. The OPAC terminals need not be confined to the library; in the case of a university, for example, they can be located in the various teaching departments, thus permitting access to the library catalogue without necessitating physical presence in the library building.

This point raises the more fundamental issue of the

library's future in an electronic information world. Traditionally the library has acted as a document store, in which individual documents could be collected, maintained and then studied or borrowed. A building was needed to house the collection and a staff to organise the holdings and make them available on demand. Users normally were required to attend the 'store' in order to gain access to its documentary collection. The availability online of documents held on a central computer at a local terminal no longer necessarily implies the physical presence of a library in which a user may consult documents. The documents must still be collected at stores and organised in such a way that they can be retrieved when requested. Storage of data on magnetic discs requires, however, only a fraction of the space needed to house printed equivalents (and technological developments are soon likely to render clumsy discs obsolete). Further, using cheap equipment (a terminal or microcomputer, modem and telephone line) the user can access the document store from home or office much more quickly than travelling to the nearest library. It is improbable, of course, that printed documents are likely to disappear, at least for some time. We are too attached to the pleasures of the printed novel, magazine and new paper. The future of specialist printed literature, however, is more doubtful. The more extreme predictions of an imminent electronic information world and the demise of print on paper need not be accepted, but further moves in this direction must be expected in the remaining years of this century.

Are such developments in information technology as have been outlined above likely to benefit mankind? Improved access to information ought to be to everyone's advantage, and theoretically computerised information systems ought to offer such improved access. They enable information to be sought via more search keys, they enable very large amounts of information to be searched at one step, they promise to reduce the time-lag between the formulation of ideas and their dissemination and so on. Amidst the undoubted enthusiasm for information technology, however, some nagging doubts persist, particularly with respect to the cost of electronic information, the possibilities for centralised control of information, and the extent of access world-wide to electronic information system.

2 COSTS

Information always has a cost; indeed, the emphasis on 'free' library services may not always have been to the library profession's advantage, suggesting as it does, that information has no cost and possibly, therefore, no value.⁴ Generally speaking, however, costs incurred in purchasing, storing, organising and retrieving documents (and the information contained within them) have been hidden from the library user—whether in public, academic or special library. Occasionally direct charges have been made—to reserve a book or more recently to make a photocopy—but users have rarely been charged for the retrieval of information. The advent of electronically stored and disseminated information has now changed this policy of free service. Many libraries of all kinds are charging 'customers' all or part of the costs incurred in online searches of bibliographic and non-bibliographic databases. In some cases the fee even includes an element to cover the services of the library intermediary who actually conducted the search on behalf of the client. Such a charge would have been most unusual in the case of a search conducted for identical information, but using printed sources rather than their machine-readable equivalents.

Why should users be directly charged for online services? When first introduced, such services were novelties, extra to the standard bibliographic services offered by the library. It seemed reasonable to make a special charge, especially when online costs were both highly visible and almost entirely related directly to the search (that is, variable rather than fixed costs). Furthermore, the introduction of online searching, in Britain and the United States at any rate, coincided with a period of severe economic constraints when resources were not readily available from within the library budget to fund new services.

The decision to charge for online services may initially have been largely pragmatic, but it is now justified on the wider base of principle. Online searching is no longer an extra service but is becoming a standard feature of many library operations. The supply of information has a price, it is argued, and this should be reflected in charges passed on to the customer. The library is a part of the service sector, and should charge for its service like other sectors.

Such arguments have much to recommend them. In times of financial shortage, it may be no bad thing for libraries to sell

their services in the market place. Such a policy, though, does have serious implications for library users. The library may now be offering a two-tier service. Printed material can be used by all without any direct charge. The results of searches carried out online, however, must be paid for, and the charges can be significant even for a very short search. It may be that certain categories of users are thereby excluded from a field library service: students in an academic library; poorer residents in a public library; junior employees in a special library. More seriously, the library may begin to re-allocate its resources so as to offer more money-earning services at the expense of its traditional print-based services. This could involve a public library, for example, in developing a sophisticated electronic business information service for commercial clients at the expense of its service to the poor, elderly, housebound, and so on, who are unlikely to require online services as presently constituted and would not in any case be able to pay for them. Interesting moral dilemmas can arise. Let us suppose that a library offering users unlimited and free access to a printed abstracting journal suddenly decides to cancel its subscription to the print version, instead offering access to the online equivalent—but now at a price to the user. Is the library now justified in charging that user for access to the same information—but in an online rather than printed format?

Such a scenario would not further the prospects of Ranganathan's second or third laws, but would foster a more elitist service, increasing the flow of information to some categories of users, admittedly, but at the expense of others.

3 CENTRAL CONTROL OF INFORMATION

The ability of computers to store in searchable format large quantities of data has raised the spectre of centrally-controlled information banks. If information means power, then fears have been expressed about the misuse of information. Data of all kinds are collected by a variety of governmental and private agencies, which can then be used for purposes other than originally intended. Misuse of information has always been possible, of course, but the capabilities of computers and information networks considerably amplify the danger of this happening. It is no coincidence that in countries like the United States and Britain, interest has recently been concentrated on 'freedom of

information', a demand that the ordinary citizen knows what information is being stored and has a right of access to it. In Britain a 'Freedom of information' Bill is intended "to establish a general right of access by the public to official information". A further Bill, the Data Protection Act 1984, is intended to establish a Registrar or data users who maintain computer files of personal data, and to give right of access by the general public to records relating to them.⁵

4 ACCESS TO INFORMATION TECHNOLOGY

The dividends from information technology may be high, but substantial investment is required if these dividends are to be realised. Computer hardware and software are required, together with telecommunication networks that can carry traffic between computer installations at high speed, cheaply and reliably. Trained staff are also required to operate the hardware. These technological and human resources, furthermore, can only function if a sound infrastructure is available—guaranteed electricity supply and telephone system, maintenance facilities in case of hardware failure, educational institutions in which the necessary skills can be imparted, etc.

The United States took an early lead in the development and implementation of information technology, followed by countries in Western Europe. The largest vendors of online information, for example, are located in the United States, although Europe now has a challenge in the European Space Agency Information Retrieval Service. Vendors can be accessed via an ordinary telephone line, but the international calls are very expensive and voice-grade lines susceptible to 'noise'. Data transmission networks tend to charge a standard rate per minute regardless of distance and the higher grade lines offer better prospects for trouble-free communication. Countries which do not have access to such networks are therefore placed at an immediate disadvantage. A growing number of online databases—bibliographic and non-bibliographic have no printed equivalents, and therefore their information content is inaccessible to those denied online searching facilities.

At the same time, however, the increasing power of cheap microcomputers is now making information technology more accessible. Small business micros can be used, for example, with information storage and retrieval packages or word processing

packages in a variety of library applications. In its Second Medium-Term Plan (1984-1989), Unesco is emphasising help to member states, and in particular the developing countries, in the creation of national and/or regional computerised databases. The aim is to facilitate the processing of locally produced information as well as relevant information from external internationally available databases. Unesco has carried out an inventory of suitable library application software packages for microcomputers, and is giving priority to portable packages which can be easily adapted to different makes of computer and made available free of charge to developing countries.⁶

Library staff trained in the use of information technology are clearly a necessity, and library schools in developing countries must decide whether they can afford to overlook the requirements of the new technology. For staff already *in situ*, short courses in specific areas—word processing, online searching, etc. will be required. Software producers can also play their part. Packages which include user-friendly features can be readily used by non-trained staff. Nor should the importance of clearly written and presented documentation be underestimated, especially if the user is reading in a foreign language.

"Every reader his book", "Every book its reader" and "Save the time of the reader": such are three of the basic laws laid down several decades ago by Ranganathan. Since those days, the means of handling information have changed dramatically. Yet the basic premises underlying a library service remain unchanged. If information technology can be properly harnessed, then the prospects for the future are promising. By appreciating the pitfalls inherent in the new technological age, a sure and safe path can be trodden towards the goal of access to information for all.

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9.2 Implementation of Facet-Based Retrieval Using A Relational Database Management System

MICHAEL A. SHEPHERD and C.R. WATTERS

Previous technology was not sophisticated enough to take full advantage of the faceted classifications, such as the Colon Classification, for the purpose of automated information retrieval. Recent developments in the area of relational database management systems (DBMS), however, are making it feasible to take advantage of faceted structures for information retrieval.

Relational DBMS offer a direct mapping between facets and attributes and between subjects and tuples. The DBMS query languages can be used to formulate queries with a faceted structure. This provides the basis for information retrieval systems that take advantage of faceted structures.

The relational structure may provide the basis for a common retrieval languages as suggested by Dr. Ranganathan.

1 INTRODUCTION

In the last few years, there has been a great deal of interest in applying various models of database management systems (DBMS) to bibliographic databases. In a DBMS, data can be shared so that new applications can be developed to operate against the same data, software development time is reduced, and the concurrency problem is controlled. As well, the data independency of a DBMS provides immunity of applications to changes in the storage structures and access strategies¹

The main focus of attention in this area has been the relational model. Crawford² has considered the application of the relational model to bibliographic data in some detail. Macleod has used the IQL query language³ to access a document retrieval system based on the relational MISTRAL system and has examined the suitability of SEQUEL⁴ and SQL⁵ as query languages in such an environment. Crawford⁶ has applied the INGRES system using the QUEL language to document retrieval. Schek and Pistor⁷ have developed an integrated database

management and information retrieval system (DBMIRS) based on the relational model although they allow un-normalized relations. Crawford and Macleod⁸ have described a fully indexed document retrieval system based on the relational model. Shepherd and Watters⁹ have shown how traditional Boolean queries can be easily mapped into the complex query languages of DBMS systems.

None of the systems described above, however, make use of the faceted nature of a subject in the organization and retrieval of information. These systems tend to organize the data along such traditional bibliographic fields as: author, title, keyword, and abstract. These systems are designed for traditional Boolean retrieval of documents based on keyword found in the various fields.

The use of facets for fulltext retrieval, not using DBMS, was investigated by Shepherd in the late 1970s but was found to be not cost-effective.^{10,11} It was suggested that more effective use of the facets could be made with more sophisticated software¹¹; uses that could be provided with a relational DBMS. Smith et. al.,¹² developed a system based on the relational model for the automatic indexing of Chemical Abstracts. This system performs a syntactic analysis of the abstracts and maps the terms into appropriate facet-like categories.

The purpose of this paper is to demonstrate that, in addition to traditional Boolean retrieval, relational DBMS can provide sophisticated retrieval based on the faceted structure of subjects. It can readily provide answers to such questions as: What are the matter isolates of a given personality? What are the energy isolates of a basic subject? and, What is the facet string for a particular document? Such information can also be used to assist in the indexing process.

2 RELATIONAL DBMS AND THE FACET STRUCTURE

A relationally organized database consists of a set of relations, each relation consisting of a flat or two-dimensional table. Each column of the table represents an attribute of the relation. Each row of a table represents a tuple that is a member of the relation.

A subject can be expressed as a set of terms and relations between terms that, when taken together, constitute the subject.

The facet string, "(1P1) Rice Plant. (1M1) Disease," can be viewed as the relation, "Personality-Matter". In this example, Personality and Matter are attributes of the relation and can be represented as columns in a Personality-Matter table. The tuple, "Rice Plant—Disease" is an entry in the table with Rice Plant in the Personality column and Disease in the Matter column. A relational DBMS would be able to retrieve the tuple by either term. It would also be able to retrieve all of the Personality Isolates in the database, all of the Matter Isolates, all of the Matter Isolates associated with Rice Plant.

In this manner, a direct correspondence can be drawn between facets and attributes and between subjects and tuples.

3 THE DEMONSTRATION SYSTEM

The system was implemented using dBASE III, a relational DBMS, on an IBM-compatible microcomputer. The attributes of the relations were chosen for demonstration purposes only. The selection of attributes is application dependent, but the examples discussed below would be typical.

The following two subjects of documents were used in the demonstration systems. Each subject is followed by the corresponding facet string.

"Chemicals are used in agriculture for the prevention of the virulence of disease of the rice plant during a dry period."

(BS) Agriculture. (1P1) Rice Plant. (1M1) Disease. (1M2) Virulence. (1E) Prevention. (2M1) Chemicals. (T1) Dry Period.

"In agriculture, the use of a sprayer for the distribution of chemicals for the prevention of the virulence of disease of the stem of the rice plant was demonstrated in the Cauvery Delta of Madras during the dry period of 1967."

(BS) Agriculture.	(1P1) Rice Plant.	(1P2) Stem.
(1M1) Disease.	(1M2) Virulence.	(1E) Prevention.
(2M1) Chemicals.	(2E) Distribution.	(3M1) Sprayer.
(S1) Madras.	(S2) Cauvery Delta.	(T1) 1967.
(T2) Dry Period.		

4 DATABASE ORGANIZATION

The demonstration system was built on only three relations: the Document Number-Document Text relation, the Term-Document relation, and the Matter-Personality relation.

Each tuple or row of the Document Number-Document Text relation (Figure 1) consists of two attributes: the original document text and a corresponding document identifier number. The document number is used in both of the other relations and provides fast access to the original document.

<i>Docnum</i>	<i>Doctext</i>
001	Chemicals are used in agriculture for the prevention of the virulence of disease of the rice plant during a dry period.
002	In agriculture, the use of a sprayer for the distribution of chemicals for the prevention of the virulence of disease of the stem of the rice plant was demonstrated in the Cauvery Delta of Madras during the dry period of 1967.

FIG 1 Document Number-Document Text Relation

The attributes of the Term-Document relation (Figure 2) include a unique term number assigned to each unique term, the facet, round, and level of each term, and the document number in which the term occurs. Each occurrence of each term in each facet string appears in this relation, along with the number of the document in which it occurs.

<i>Tnum</i>	<i>Term</i>	<i>Facet</i>	<i>Round</i>	<i>Level</i>	<i>Docnum</i>
001	Rice Plant	P	1	1	001
002	Disease	M	1	1	001
003	Virulence	M	1	2	001
004	Prevention	E	1		001
005	Chemicals	M	2	1	001
006	Dry Period	T	1	1	001
001	Rice Plant	P	1	1	002
007	Stem	P	1	2	002
002	Disease	M	1	1	002
003	Virulence	M	1	2	002
004	Prevention	E	1		002
005	Chemicals	M	2	1	002
008	Distribution	F	2		002
009	Sprayer	M	3	1	002
010	Madras	S	1	1	002
011	Cauvery	S	1	2	002
012	1967	T	1	1	002
006	Dry Period	T	1	2	002

FIG. 2 Term-Document Relation

The Matter-Personality relation (Figure 3) allows one to quickly retrieve all of the Matter Isolates associated with a specific Personality. This table could easily be extended to include all of the various facet categories. It also provides access to the document in which the relation occurs through the DOCNUM attribute.

<i>Mterm</i>	<i>Pterm</i>	<i>Docnum</i>
Disease	Rice Plant	001
Virulence	Rice Plant	001
Chemicals	Rice Plant	001
Sprayer	Rice Plant	002

FIG. 3. Matter-Personality Relation

5 RETRIEVAL CAPABILITIES

The menu of Figure 4 indicates the various retrieval capabilities implemented in the demonstration system. These options do not include Boolean retrieval for, although Boolean retrieval is easily implemented, the purpose of this paper is to demonstrate access using the facets. Selection 0, "STOP", is the command to exit the system.

SELECTION MENU

- 0 STOP
 - 1 FIND FACET OF TERM
 - 2 GET FACET STRING FOR A DOCUMENT
 - 3 GET ENTRIES BY FACET
 - 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
 - 5 RETRIEVE DOCUMENT BY TERM
 - 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER
- ENTER CHOICE:

FIG. 4. Retrieval Capabilities Available to User

Figure 5 shows the system response to the user selection of menu item 1, FIND FACET OF TERM". In this example, the user requested information of the phrase, "DRY PERIOD". The system responds by displaying the round, facet, and level of each occurrence of the term. In addition, the system displays the document numbers of in which the term appears.

SELECTION MENU

- 0 STOP
- 1 FIND FACET OF TERM
- 2 GET FACET STRING FOR A DOCUMENT
- 3 GET ENTRIES BY FACET
- 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
- 5 RETRIEVE DOCUMENT BY TERM
- 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER

ENTER CHOICE

ENTER TERM: DRY PERIOD

<i>Term</i>	<i>Round</i>	<i>Type</i>	<i>Level</i>	<i>Docu</i>
DRY PERIOD	1	T	1	001
DRY PERIOD	1	T	2	002

FIG 5. Find Facet of Term

Figure 6 shows the system response to the request to retrieve the facet string associated with a particular document. In this example, the user has requested the facet string for document number 1. As shown in the other examples, the document number can be obtained in a number of different ways and the document itself can be displayed.

SELECTION MENU

- 0 STOP
- 1 FIND FACET OF TERM
- 2 GET FACET STRING FOR A DOCUMENT
- 3 GET ENTRIES BY FACET
- 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
- 5 RETRIEVE DOCUMENT BY TERM
- 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER

ENTER CHOICE 2

ENTER DOCUMENT NUMBER 001

<i>Term</i>	<i>Round</i>	<i>Type</i>	<i>Level</i>
RICE PLANT	1	P	1
DISEASE	1	M	1
VIRULENCE	1	M	2
PREVENTION	1	I	
CHEMICALS	2	M	1
DRY PERIOD	1	T	1

FIG. 6 Get Facet String for a Document

Figure 7 shows the system response to a request to retrieve all the matter isolates in the database. The system also displays

the document numbers in which each term occurs.

SELECTION MENU

- 0 STOP
- 1 FIND FACET OF TERM
- 2 GET FACET STRING FOR A DOCUMENT
- 3 GET ENTRIES BY FACET
- 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
- 5 RETRIEVE DOCUMENT BY TERM
- 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER

ENTER CHOICE 3

ENTER P'M/E,S/T,M

TERM	DOCNUM
CHEMICALS	001
CHEMICALS	002
DISEASE	001
DISEASE	002
SPRAYER	002
VIRULENCE	001
VIRULENCE	002

FIG. 7. Get Entries by Facet

Figure 8 shows the system response to a request for all the matter isolates associated with a given personality isolate.

SELECTION MENU

- 0 STOP
 - 1 FIND FACET OF TERM
 - 2 GET FACET STRING FOR A DOCUMENT
 - 3 GET ENTRIES BY FACET
 - 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
 - 5 RETRIEVE DOCUMENT BY TERM
 - 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER
- ENTER CHOICE 4
- ENTER P-TERM: RICE PLANT

M-TERM
 CHEMICALS
 DISEASE
 SPRAYER
 VIRULENCE

FIG. 8. Get M-Isolates for a Given P-Isolate

Figure 9 shows the system response to a request to retrieve a document in which a particular term occurs. In this example,

the document text (DOCTEXT) is displayed starting on the line following the term and its round, facet, and level.

SELECTION MENU

- 0 STOP
 - 1 FIND FACET OF TERM
 - 2 GET FACET STRING FOR A DOCUMENT
 - 3 GET ENTRIES BY FACET
 - 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
 - 5 RETRIEVE DOCUMENT BY TERM
 - 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER
- ENTER CHOICE:5

<i>Term</i>	<i>Round</i>	<i>Type</i>	<i>Level</i>	<i>Doctext</i>
SPRAYER	3	M	1	

ENTER TERM: SPRAYER

In agriculture, the use of a sprayer for the distribution of chemicals for the prevention of the virulence of disease of the stem of the rice plant was demonstrated in the Cauvery Delta of Madras during the dry period of 1967.

FIG. 9. Retrieve Document by Term

Figure 10 shows the system response to a request to display a document by its number. This number can be retrieved in a number of different ways, as shown in the previous examples of retrieval. In this example, the text of the document title is displayed in the line following the its number.

SELECTION MENU

- 0 STOP
 - 1 FIND FACET OF TERM
 - 2 GET FACET STRING FOR A DOCUMENT
 - 3 GET ENTRIES BY FACET
 - 4 GET M-ISOLATES FOR A GIVEN P-ISOLATE
 - 5 RETRIEVE DOCUMENT BY TERM
 - 6 RETRIEVE DOCUMENT BY DOCUMENT NUMBER
- ENTER CHOICE:6
- ENTER DOCUMENT NUMBER:002

DOCNUM DOCTEXT

002

In agriculture, the use of a sprayer for the distribution of chemicals for the prevention of the virulence of disease of the stem of the rice plant was demonstrated in the Cauvery Delta of Madras during the dry period of 1967.

FIG. 10. Retrieve Document by Document Number

6 ADDITIONAL CAPABILITIES

The demonstration system described above does not make full use of all of the DBMS features. Other DBMS capabilities include the following: sorting by various fields to present the data in a different order, formatting of output, and elimination of duplicates for output. A command file can be established to make the DBMS commands transparent to the user.

7 CONCLUSIONS

This paper has demonstrated that current relational DBMS have the capability to provide sophisticated retrieval based on the faceted structure of subjects. This is achieved by treating subjects as tuples and by mapping facets to attributes. The use of such a relational structure may even be able to provide the basis for a common retrieval language as suggested by Dr. Ranganathan.

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SECTION 10

LIBRARY MOVEMENT

10.1 Library Legislation and Ranganathan

B.P. BARUA

Highlights the role played by Dr S.R. Ranganathan in bringing about library legislation in India. It was by Dr Ranganathan's efforts that library services could be provided to the general public on the basis of a law. He helped in drafting library bills for several states including preparation of a Model Public Libraries Act. He was very successful in the south India in introducing library legislation. Also gives a critical appraisal of Dr Ranganathan's efforts to solve the resources problem by legislation.

I INTRODUCTION

S.R. Ranganathan may be regarded as the father of library legislation in India. Before Ranganathan the thrust of library movement was directed to the promotion of library services by voluntary organisations with financial support from the benevolent rich and subscription from the members. Ranganathan was the first Indian to realise that effective library service to the general public could be provided only through governmental effort and on the basis of a law. He gave shape to his ideas by drafting library bills for several states including a Model Public Libraries Act for constituent states and a Model Union Library Act for the Centre. He propagated the idea of library legislation with a missionary zeal from different forums. Ranganathan was successful in the South in Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra, but he failed to make any dent in the north; only one state, West Bengal, adopted a library law, some years after his death, in 1979. It is therefore pertinent to

make a critical assessment of Ranganathan's ideas in the sphere of library legislation.

2 INFLUENCE OF U.K.

The concept of library legislation is not novel. The first Public Libraries Act was adopted by the United Kingdom as early as 1850. The Act empowered the local authorities to provide public library service through local taxation in a limited scale. The restriction on taxation and expenditure was withdrawn by the Act of 1919. Yet it continued to be a permissive legislation. There was no provision in the Act for specific grant-in-aid. No government department was made responsible for supervision. Nor was there any provision for co-operation among public libraries and co-ordination of their services. The government did not keep any power in its hands to persuade or pressurise a local authority for starting or improving services. In spite of these defects the legislation gave great impetus to the phenomenal growth of public libraries, and by the end of forties the United Kingdom could claim total coverage of its population. Ranganathan was greatly influenced by the British pattern of library legislation. Ever since his return from England in 1925, Ranganathan wanted to introduce that model for developing public library services in India.

3 PROGRESS OF LIBRARY LEGISLATION

Ranganathan's movement for library legislation can be divided into two broad periods: (1) Pre-Independence Period, 1930-1947 and (2) Post-Independence Period, 1948-1972. In 1930 Ranganathan presented a draft Model Public Libraries Act for India in the Library Services Section of the First All Asia Educational Conference held in Benaras. The genesis of library legislation in India can be traced to this Model Act. Attempts were made to enact Public Libraries Act in the then Bengal, Madras and Bombay provinces in the thirties, but they failed mainly due to the opposition of the foreign rulers on the ground that resources were not available for undertaking the responsibility. At this stage Ranganathan was even prepared to substitute the compulsory financial clauses by permissive clauses in his eagerness to get a library law enacted in Madras.

After Independence the conditions became favourable in

Madras where grounds had already been prepared by Ranganathan and Madras Library Association. The Madras Public Libraries Act was passed in 1948. The Act has since been renamed as Tamil Nadu Public Libraries Act. It is again due to the influence of Ranganathan that the then Hyderabad state could adopt a library law in 1955. After the creation Andhra Pradesh in 1956, following the merger of Andhra region of the former Madras province with Hyderabad state, both the Madras Public Libraries Act and the Hyderabad Public Libraries Act were substituted by the Andhra Pradesh Public Libraries Act in 1960. In its essential features the Andhra Pradesh Public Libraries Act has followed the Madras model, but the Act also partially remedied the defect of the Madras Public Libraries Act in so far as it incorporated an element of tighter supervision over Local Library Authorities. Ranganathan's ideas on library legislation found full manifestation in the Mysore Public Libraries Act, 1965. For, in Mysore, the Government took the initiative and set up a committee under the Chairmanship of Ranganathan for drafting a Public Libraries Bill. The Mysore or Karnataka Public Libraries Act is a vastly improved Act which removed most of the defects of the Madras and Andhra Pradesh Acts. The Maharashtra Public Libraries Act, 1967 made a vital departure from the Ranganathan's model primarily because it does not contain any provision for library cess and it lays more stress on the development of public libraries through the system of grants-in-aid. Ranganathan gave final shape to his ideas in the Model Public Libraries Act which was revised in 1972 and which formed part of the proceedings of the All-India Seminar on Public Library System held in Bangalore during 28-30 April 1972.

In addition to the states mentioned above, Ranganathan prepared draft library bills for Uttar Pradesh, Gujarat, Kerala and Assam. But nothing came out. After Ranganathan only one state, West Bengal, adopted a library law in 1979, somewhat on the model of the Maharashtra Public Libraries Act.

4 BASIC FEATURES OF LIBRARY LAW

The basic elements of Ranganathan's Model Public Libraries Act are discussed in brief here.

1 *State Library Authority*—Minister for Education, accord-

ing to Ranganathan, shall be the State Library Authority. It will be his responsibility to provide for an adequate library service in the state. No such "State Library Authority" was envisaged in the Madras Public Libraries Act and the Andhra Pradesh Public Libraries Act. In the Public Libraries Act of Karnataka, the State Library Authority was provided, but it was merely a substitute of State Library Committee. We thus see a change in Ranganathan's concept of State Library Authority, probably as a result of the passing of Public Libraries and Museums Act, 1964 in England where the Secretary of State was vested with the power to superintend and promote the improvement of library services provided by the local authorities. The principle of state responsibility for library service received recognition by this Act.

2 *State Library Committee*—The State Library will be advised by a State Library Committee.

3 *Department of Public Libraries*—There is to be a separate Department of Public Libraries with the State Librarian as its head.

4 *State Library Service*—The need for a State Library Service was felt in the sixties. It will include persons serving under Local Library Authorities. All members of the service shall be government servants.

5 *State Librarian*—The State Librarian will not only act as the Librarian of State Central Library but also function as Head of the Department of Public Libraries. Director of Public Libraries has been substituted by the State Librarian so as to ensure appointment of a professional as head of the department.

6 *Local Library Authority*—Since library service is to be provided locally by an organisation or institution the nature of local authority needs to be identified. In U.K. Borough Councils and Country Councils were the agencies of local self-government and they constituted local library authorities. Ranganathan considered the districts and cities over one lakh population as viable local library authorities. An autonomous Local Library Authority having power to levy local taxes is a significant aspect of library law in U.K. Ranganathan has adopted and recommended that model for library legislation in India. These local library authorities are called District Library Authority or City Library Authority as the case may be. A Local Library Authority may be superseded by the state government for gross failure or abuse of power.

7 *State Library Fund and Local Library Fund*—Library service will be financed by two funds: State Library Fund and District/City Library Fund. The State Library Fund will consist of grants made by the State Government, grants made by the Central Government, gifts and contributions and income from other sources. The District or City Library Fund will have an additional element of library cess. The base of library cess has been widened from property tax to other taxes in the Karnataka Act. The Model Act of 1972 does not specify the taxes but left this to be decided under Rules.

1 *State Central Library System*—The Model Act also lays down the network of State Central Library System with State Branch Service Library, copyright duties, State Library for the Blind, State Bureau of Inter-Library Loan, State Bibliographical Bureau and State Bureau of Technical Services.

9 *Library Development Plan*—Every Local Library Authority is required to prepare a library development plan of the locality for submission to the Government.

10 *Use, Standard and Report*—The Act also lays down general procedures of inspection, supervision, report, standard, use etc.

5 IMPACT OF RANGANATHAN

The Model Library Act of 1930 prepared by Ranganathan gave direction and purpose to library movement in India. Draft bills were prepared for different states, these were discussed and debated in All-India Library Conferences and the annual sessions of state level library associations from time to time; efforts were made to introduce the bills in state legislatures; and some of the states viz. Tamil Nadu, Andhra Pradesh and Karnataka were persuaded to enact library legislation on the basis of the model recommended by Ranganathan.

The model library Act of Ranganathan, as reflected in Tamil Nadu (Madras) Public Libraries Act, also influenced the recommendations of the Advisory Committee for Libraries or Sinha Committee appointed by the Ministry of Education, Government of India in 1957. As a sequel to the Sinha Committee Report the Government of India prepared a Model Bill in 1963 which was slightly revised in 1965. The Model Public Libraries Bill has many similarities with Ranganathan's Model Act viz. State Library Authority, Local Library Authority, State Library

Fund, Local Library Fund with library cess etc. There are also some vital differences between the two models. Firstly, the Govt. of India's Model Public Libraries Bill recommends Director of Public Libraries (DPL) as the head of the department; State Librarian will head the state library system and will be subordinate to DPL. Secondly it defines the scope of District Library System having jurisdiction over City Libraries, Town Libraries, Block Libraries and Panchayat Libraries, Thirdly, the City or Town or Block Library will have separate entity and autonomy with a separate committee and a separate library fund. Fourthly, it gives a special role to State Library Association as a cooperating cultural and professional organisation. Ranganathan criticised the Model Public Libraries Bill on several grounds. It does not contain any provision for library co-operation. Nor does it provide for supersession of an erring Local Library Authority. According to him, the most serious error of the bill concerns the utilisation of library cess raised in a district—fund raised by cess in a Town is to be retained by the Town Library Committee, cess amount raised in a Block, to be retained by the Block Library Committee and so on. This will mean dissipation of small library resources and poor library service to the public.

The Working Group of the Planning Commission prepared another Model Public Libraries Bill in 1966. It made the first major departure from Ranganathan's system. The bill recognised the principle of state responsibility for the development of an integrated and adequate public library service. The machineries of library service have been identified to be State Library Council, State Library Directorate and State Central Library. The District Library System is to comprise the District Library, Municipal/City/Town Library, Block Library and Anchal/Panchayat Library. No mention has been made of State Library Fund, District Library Fund or library cess. It is the responsibility of the State Government to provide library service through annual budget like other essential services. The absence of a financial clause has been criticised by Ranganathan. According to him, it is a make believe bill lacking the essential clauses for the smooth working of a Public Libraries Act.

This was followed by the Maharashtra Public Libraries Act (1967). The Act has not provided for the creation of a Local Library Fund with library rates. Libraries are to be supported with grants from the State Library Fund. The District Library

Committee is a non-statutory body. According to Ranganathan, this will perpetuate subscription library system and cut out the majority people from getting free book service.

The West Bengal Public Libraries Act (1979) is modelled on the Maharashtra Public Libraries Act except that it provides for a District Library Fund without library cess. Ranganathan had no scope to comment on this Act.

The impact of Ranganathan's ideas on library legislation is so powerful that the library professionals in India by and large consider the Karnataka Public Libraries Act (1965) and the Model Public Libraries Act (1972) framed by him as the best or the ideal legislation.

6 MODEL UNION LIBRARIES ACT

In addition to Public Libraries Acts, Ranganathan also suggested the enactment of a Union Libraries Act for developing a system of National Central Libraries. Ranganathan is reported to have submitted a memorandum along with draft Union Library Bill to a committee of the Ministry of Education in 1948. This memorandum and draft bill was published by the University of Delhi with a title "Library Development Plan : A thirty year Programme for India". A refined version of the bill was published in the second edition of Ranganathan's *Five Laws of Library Science* in 1957. The Model Union Libraries Act also formed part of the seminar on Public Library System, 1972 and is included in the book 'Public Library System'. In this Act Ranganathan has recommended a system of National Central Libraries viz. National Copy-Right Library, National Dormitory Library, National Service Library, National Seafarers Library and National Central Libraries. The Model Act also provides for a National Department of Libraries, a National Committee of Librarians, a National Librarian and a National Library Fund. In his opening address Ranganathan said, "A Union Library System is absolutely necessary as something which binds together and supplements the resources of the library systems of each one of the Constituent States. It has also some specific functions in the context of today. A Union Library Act is necessary to make the Union Government discharge these functions efficiently."

7 CRITICAL APPRAISAL

Ranganathan seems to have laid over emphasis on library legislation. The basic impediment in developing an adequate library service is dearth of resources and not legislation. If resources are available a good and efficient service can be organised and rendered by administrative action. Out special libraries and university libraries are more developed than public libraries and school libraries simply because the former are receiving better financial support than the latter. Ranganathan himself realised this. To quote from his opening address to 1972 seminar, 'To run a public library needs money. If it is to be free, who is going to pay for the purchase of books, salary of the staff and various other expenses.' He ruled out the possibility of running an efficient library service with subscription and private benefication in a socialistic pattern of society. The only source left over is public fund. To make away public fund permanently—even a fraction of —year after year for a particular service should necessarily have legislative sanction. If we leave it to the Executive, we know the ups and downs that library finance will have to undergo. Anything based on legislation is mere stable that is our experience. Therefore, it is, that the public library finance should be legislation based. That is what is happening in country after country from about the middle of the nineteenth century.' Thus Ranganathan tried to solve the resource problem by legislation. But a legislation which does not ensure adequate resources for library service cannot improve matter much. Collection of a small amount by way of library cess does not solve the problem either. On the other hand, better library service can be provided by a state which has not adopted a library law but made provision for better funding of the service out of the state exchequer. All these phenomenon are in evidence in India today. Thus, what is needed is an awareness to regard public library service as an essential service involving larger allocation of funds. The rest of the things will follow suit. Secondly, Ranganathan advocated a particular pattern of library legislation. The important characteristic of his library bill is to create a statutory Local Library Authority with power to levy rates and incur expenditure out of the Local Library Fund. A controversy has developed about the extent of autonomy granted to the Local Library Authorities. Ranganathan himself realised the danger of allowing too much autonomy which his system would

create. He therefore suggested the incorporation of a supercession clause for gross failure of duties or abuse of power. In the Karnataka Public Libraries Act the Deputy Commissioner and the Mayor has been made the ex-officio Chairman of the District Library Authority and the City Library Authority respectively instead of an elected Chairman. With the gradual provincialisation of the staff of Local Library Authorities the extent of their autonomy has been considerably reduced. It is therefore but natural that Maharashtra Public Libraries Act which did not create a Local Library Fund opted for a nominated District Library Committee. Thirdly, the desirability of raising funds through library cess has been questioned. If the government could provide other essential services like education and health without imposing and cess, it is also expected to provide public library service without cess. Viewed from another angle, if the state is unable to meet the basic needs of other essential services it is futile to insist on library legislation with library cess. Fourthly, the viable size of a Local Library Authority, a District and a City over one lakh population, as recommended by Ranganathan, may be disputed. We have small and backward districts in some parts of the country. Cities over one lakh population are growing in number. The present trend in the western countries is for a larger unit or integration of smaller units for better service. Fifthly, Ranganathan is silent about the need for library legislation in small states and Union Territories where the number of libraries are not many. It is possible and advisable to develop efficient library service through executive action. Finally, the Model Union Library Act of Ranganathan has many weak elements. Though the concept of a National Central Library System is highly commendable there is considerable scope to differ with the details laid down in the Model Act. It is not understood why there should be a central Seafarers Library and Central Contact Library in the National Library System. They can at best come under National Service Libraries. Instead of creating a separate Copyright Library it would perhaps be desirable to recognise one of the deposit libraries as the Copyright Library. The provision for a National Librarian to be appointed by rotation from among the National Service Libraries for a period of three years is unrealistic. It may also be noted that Ranganathan has not proposed for the constitution of an autonomous body like the British Library to develop the National Central Library System.

The criticisms against Ranganathan's model of library legislation are somewhat justified considering the slow progress of legislation in India. Some of the defects in his system, as revealed in the course of operation of the Acts, have been remedied by amending the Public Libraries Acts in Tamil Nadu, Andhra Pradesh and Karnataka.

8 CONCLUSION

Despite the criticisms, the basic concept of Ranganathan for developing legislation based public library services still holds good. It has been recommended by Unesco and other expert bodies. If a library law is not required to ensure flow of funds in a socialist or socialistic society, it is still considered necessary to ensure the organisation of an efficient system of co-operation and co-ordination of services and resources for rendering optimum service to the public.

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SECTION II

RANGANATHAN AS HUMANIST

11.1 Ranganathan As Humanist

M.A. MAJEED KHAN

Presents the life of Dr S R Ranganathan while engaged in library profession for nearly 50 years. As a student, he had quick understanding, grasp and good memory. After M A in Maths started his career as a teacher in Madras University. In 1924, he was appointed the first librarian of Madras University and worked there for next 20 years. It was here that he designed Colon Classification, theory of Library Catalogue and Classified Catalogue Code. Worked for library legislation in various States of India. Formed MLA and started first Library Science School. Later he shifted to Delhi University and visited many foreign countries. Helped to Establish Indoc in 1951 with support from Unesco. Some achievements were Vice-president of FID 1953-56 & 1959-61, Vice-president of LA of U.K. Received many honours and awards like Padamshree, National Prof of L S, Margaret Mann Citation award from ALA and Grand Knight of peace award.

Shiyali Ramaritra Ranganathan was born on August 12th 1892 at Shiyali, Tanjore District, Tamil Nadu. He was the first child of his parents mother Seetalakshmi, a simple, religious lady and father, Ramamritha Iyer. He had younger brothers and a sister. One of his brother died in his early life. His father died on 13th January, 1898 at the very early age of 30 leaving the 6 year old Ranganathan to the care of his mother who lived for sixty more years and died in January 1953 at the age of eighty-four years. Ranganathan after completing his elementary education, entered the Sabanayaka Mudaliar's Hindu High School. His power of understanding, quick grasp and remarkably good memory made up for all his physical infirmities during the

school days and he was always the top boy in his class. He passed the Matriculation examination in first class in January, 1909. Ranganathan came to Madras for his College education. He joined the Madras Christian College for his Intermediate course from 1909 to 1911. In March 1911 he passed his Intermediate Examination in first class. Then he joined for the B.A. Degree course in the same college from 1911 to 1913. In April 1913 he passed the examination in first class. In June, 1913 he joined the M.A. (Mathematics) in the same college. Prof. Ross was impressed with Ranganathan's intelligence. He became a pet student of Prof. Ross. He passed the M.A. examination in Mathematics in 1916. The Christian college Madras intended to appoint Ranganathan on its staff in the vacancy of Prof. Ross going out on leave for one year from April, 1916. Due to the call of the first world war duties prevented Prof. Ross from going out to England and consequently under the advice of the college authorities Ranganathan joined the Teachers College, Saidapet and secured his L.T. Degree in 1917. As he was quiet and aloof by nature, his intelligence and ability attracted by a quite number of professors. In 1917 he was appointed to the subordinate Educational Service of the Government of Madras presidency as an Assistant Professor of Mathematics. He worked in the Government College, Mangalore and Coimbatore. In these colleges he taught physics to the school final year students, mathematics to the Intermediate classes. He was transferred to Presidency College, Madras as Assistant Professor of Mathematics. He joined the college on 7th July 1921 and worked for about two and half years. Ranganathan was a remarkable teacher. He was a revolutionary in teaching mathematics. He was married in 1907. His wife was very kind to him and to his mother. She died in 1928. After one year Ranganathan married Sarada.

Srimathi Sarada looked after Ranganathan for over forty years by that time he was able to engage himself with single-minded and devout dedication to the cause of Library Science and put in relentless hard work in pursuit and helped to build up the glorious progress that India has made in libraries and library science. Ranganathan's only son T.R. Yogeswar was born in 1932.

Ranganathan was appointed to the newly created post of the librarian in Madras University Library, Madras. He became the first Librarian of the University library on 4th January 1924

and worked in the University until 1944. He was sent to England on deputation in 1924-25 for training in Library Science. He did his apprenticeship in Croydon Public Libraries under the famous Librarian W.C. Berwick Sayers and others. Ranganathan's impression on Sayers was so much that he saw the great potentialities for the libraries in India and the great possibilities ahead in India for libraries in the educational progress of the country. The training and inspiration of Sayers opened up his vision. Ranganathan was not satisfied with the methods and techniques in Library Science that he saw in England. The method of library training in England did not attract him. So Ranganathan began to think seriously that how he should build up the subject and the profession that its foundations.

When he returned to the Madras University Library, after his one year training abroad, he worked in the University Library for two decades and concentrated his full attention not only in improving the Library, but also in developing new methodology and techniques and laying the foundations for the theory and practice of studying all aspects of library science. He built up the most advanced library of the university, providing very efficient and active library service. When he entered the library profession he was searching for the over all basic principles in library science. His deep examination resulted in the discovery of the five fundamantal principles which he published in his famous book "FIVE LAWS OF LIBRARY SCIENCE" in 1931.

When he was at the Madras University Library he designed, the COLON CLASSIFICATION which was a great breakthrough in the theory and application of classification. He experimented his new scheme at the University Library, Madras for two decades. The first edition was published in 1933 and also published the classical work prolegomena to library classification in 1937. He was dissatisfied with the Dictionary Catalogue and its codes. He worked on the foundation of the theory and practice of cataloguing and published two outstanding works, the theory of library catalogue and the classified catalogue code both of which were remarkable for breaking the new ground and beginning the progress in the field of cataloguing.

Ranganathan founded the Madras Library Association on 3rd January, 1928. With a great interest he worked as the Secretary of this Association for twenty years, i.e. 1928-1948.

Ranganathan was the first in India to start the school of library science in 1929; under the aspiccs of the Madars Library Association he conducted training classes. He also conducted training classes in the Madras University Library. This standard school of Library science became famous all over India.

In 1930 he turned his interest to library Legislation and drafted the Model Library Act in 1930 and the first Library bill for Bengal State in 1931. He drafted the constitution of the Indian Library Association which was started in the year 1933. Ranganathan's work in the library profession attracted Sir Maurice Gwyer, the Chief Justice of India and the Vice-Chancellor of the University of Delhi. He assisted Delhi University by drafting the library development plan for the university in 1942. He prepared the First Draft of the Library Development Plan for India, a thirty years programme in 1945, at the request of the Commissioner for Education, Government of India.

In 1945, Ranganathan left Madras University and joined Banaras Hindu University for a few years. Sir Maurice Gwyer invited Ranganathan for working in Delhi University. He joined the Delhi University where he established a department of Library Science giving library science education for the B. Lib. Sc., and M.Lib. Sc., Degrees. In 1948 University of Delhi University provided facility for Doctorate in library science by research in 1948. Delhi University was the first university in the Common Wealth to start Masters and Doctorate programme in library science in 1956. Dr. Ranganathan visited Europe and U.S.A. from June to September, 1948. During this foreign tour he visited all important libraries of various kinds, delivered lectures on libraries and library education and taught library science in library schools in various universities. He attended conference of Federation of International Documentation and also the conference of the International Standards Organisation, Technical Committee at the Hague in July 1948.

Ranganathan realised that library legislation is the base on which best public library system could be built. He drafted Library Bill and development plans for several states in India. Madras got the first public Libraries Act in August, 1948. This was the first library legislation in the country. Later public library Acts passed in three other states, Andhra, Kerala and Mysore.

From 1944 to 1953 he was the president of the Indian Library Association. From 1948 to 1957 he was Vice-President of

Madras Library Association and from 1958-59 he became the President of the Madras Library Association. He was the sole force behind library movement in Mad.as. He was the guiding force in library movement in most of the states in India. At the National level he negotiated with UNESCO for the establishment of Delhi Public Library as a Pilot Project. This project developed in creating library consciousness and spread reading habit in Delhi State. With the collaboration of UNESCO he helped to establish INSDOC (Indian National Scientific Documentation Centre) in 1952.

Ranganathan's work and reputation spread far and wide and his advice and guidance were eagerly sought after by various types of library organisations all over the world. He was elected Vice-President of the International Federation for Documentation during the year 1953-56 and 1959-1961. He was also elected Honorary Vice-President of the Library Association of the United Kingdom. In 1958, he visited United States, Canada and Japan where he was a visiting professor in various universities. He delivered lectures on the fundamental contributions made by India in the Theory and Practice of Library Classification and Cataloguing. He was the first Chairman of the Library Committee of the University Grants Commission of India. In 1958 he advised the Commission in its financial and other assistance programmes for the development of University and College Libraries in the country. As the Chairman of the Library Committee of the Indian Standards Institutions he developed a number of standards relating to classification, cataloguing, library buildings, fittings and furniture as guidelines for the development and progress of libraries in India.

He made a donation of one lakh rupees to Madras University in July, 1956 for the establishment of the Sarada Ranganathan Chair in Library Science. In 1961 he made another magnificent donation for the establishment of Sarada Ranganathan Trust which provides for Library Education and Training and Publications in Library field. In the same year he visited scientific and research institutions, libraries and documentation centres in Russia.

Due to development of documentation service in the country, there arose the need for the training and research in Documentation, to provide suitably qualified personnel for documentation service in Humanities and Sciences. In 1962 Ranganathan founded the Documentation Research and Training Centre with

the assistance of the Indian Statistical Institute at Bangalore. He was the Director and Honorary Professor of this centres.

In 1964 Ranganathan visited Rutgers State University, New Jersey, U.S.A. and was the leader of a Seminar on the world famous COLON CLASSIFICATION designed by him.

In fields of Library Classification and Cataloguing monumental work was done by him. As such the University of Pittsburg, Pennsylvania, awarded him the D. Litt. Degree in June, 1964.

In developing Library Science as a discipline of a very high order, Ranganathan's work, devotion, dedication and service would be remembered always. In recognition of this, the Government of India conferred on him the National Honour—*PADMASHREE*. His continuous research contributions in Library Science attracted the Government of India and he was appointed as the National Research Professor of Library Science in 1965. In 1970 he was recipient of the "*Margaret Mann Citation*" from the *American Library Association* for his outstanding contribution in the field of Library Classification and Cataloguing. In the same year *The Mark Twain Society of America* awarded him the title "*Grant Knight of Peace*"

He was engaged in library profession from January 4th 1926 to 27th September, 1972 for nearly fifty years; It was a glorious life of dedication to a single cause. At the same he was universal because his work was not confined to any geographical boundary.

11.2 Ranganathan As Humanist

S.L. SANGAM

Discusses Dr S.R. Ranganathan's multifaceted personality. Highlights his spiritual and religious Commitments. Also deals with his simplicity in lifestyle and outstanding creativity. Above all the sections of the paper points out to the Dr. Ranganathan's broad humanism.

1 INTRODUCTION

Dr S R. Ranganathan, Father of Library Science in India, is no more among us. He left for his heavenly abode on the evening of 27th Sept. 1972, at the age of 80 at Bangalore. We mourn his sad demise because he picked us out of dust, made the library profession a respectable one to enable us to live honourably.¹ He was a '*Bheesma*' in the real sense of the term and it was his life's greatest passion to bring librarianship *at par* with other professions which he actually did. Besides being one of the greatest librarians of our time, he was a rare species of a truly great man. Who so ever came in his contact were invariably overtaken by his intellectual capacity. The entire library profession in India for that matter is indebted to him. Ranganathan was a wonderful combination of many aspects of human knowledge with a proportionate blending of scientific thinking. More than anything he was a great humanist of *par excellence*.

2 LOVER OF GOD

He was profound in religious thoughts. He was well versed in Hindu religious literature of Ramayana and other epics. He made use of this knowledge and religious background in his pursuits Library Science.

There were aspects of his life that a westerner found it hard to understand. One of the close associates of Ranganathan stated thus, "It seemed strange to me that a man of such in-

tellectual eminence should have allowed his life to be ruled by what I took to be superstitions: lucky numbers, auspicious dates, predictions and the like. But I had not had his experience of life in a country where the "occult pressure" is tremendous. When he was a mathematics teacher in his late twenties he met a former schoolfellow who had become a rishi who predicted things about him that: 1 he would change his job (but he loved mathematics), 2 he would go abroad (most unlikely particular for a strict Brahmin), 3 he would write many books (and he at that time had no idea of doing such a thing), and 4 his wife would die on a named date. He thought nothing of these things until, on the very day named, his wife was drowned in the pool at a temple she visited daily, and then all of them came back to his mind. He dated his own acceptance of transcendental ideas from this experience. It led him to an acceptance of the view that there was a firm purpose in life (yes, even in my sudden appearance in Madras!) and to his belief that nothing was wasted."²

Palmer through a Englishman was given a ceremonious welcome in Ranganathan's home, even being fed these to his satisfaction.

Thomson (from Ealing), who had wandered in India in 1920's in search of "the Truth" and whom Ranganathan had found on the sea beach and brought to the shelter of his own home, where he stayed at intervals over several years. He was in fact overwhelmed by the profound knowledge of Dr S.R. Ranganathan in all aspects of life.

3 SIMPLE LIVING AND HIGH THINKING

Ranganathan was earning a good salary at Madras, but he lived a very simple and almost a 'yogic' life. He believed in simple living and high thinking, and even he proved it practically. His simple food, habits, homespun garments, barely furnished abode and even without the electric light. There are many areas where Ranganathan had clearly demonstrated his well planned economy.

4 FULL MAN

He used to spend part of his salary to the enable the poor students to continue education. Much of his earnings piled up,

and after retirement he gave away his entire savings to Madras University to establish a chair in Library Science. Later on in his seventies, his salary as National professor of Library Science, untouched because he had his own pension which sufficed his livelihood. In 1965 he said to Palmer "Palmer, I don't know why people worry about money. With no effort it piles itself into heaps. Twice I have given it away, but it always returns. This is because I do not worry about it." It shows his kind heart and his gracefulness in bounty. This is what made his personality a total personality.

5 AFFECTION TOWARDS CHILDREN

Once Ranganathan had been to London. He was the guest of DJ Foscett. It was Sunday; so members of the family were not accustomed to be awakened at six O'clock in the morning. But he got up early in the morning, and woke up Foscett's son, aged six. He started conversation, on the construction and operating of those little paper kite that one used to make to fly across the room. Their conversation was how to make a kite that would fly better than any other kite. It shows how he used to mingle with kids and enjoy their company.

6 INTERNATIONALIST

He was a recognised an internationalist because of his international outlook and views. "Dr Coblans emphasizes and underlines his contribution to international progress. It is interesting to remember that as Dr Coblans says, he didn't know French and he didn't know German and he didn't know Italian, nevertheless he could quote from the works of Goethe and Dante. He knew their works, he knew what they had to say to humanity, and even if he did not know their languages, he knew their spirit."³

7 LIBRARY SERVICE AND HUMANISM

Ranganathan recognised many aspects of library service including books, catalogues and reference materials as artificial in the sense of being human artifacts. He stressed that this artificiality required the mitigating geniality of human service in order to achieve maximum utility in that if a "human personality is not

provided; the potentially great plenty in the holdings of the libraries of today will be nothing but mockery.⁴

8 CONCLUSION

To achieve lasting results, observes Ranganathan, "the right way, according to modern humanism, is to give weight to personal help to readers in libraries". So that they could derive maximum satisfaction. The sense of satisfaction leads the users to the stage of joy and happiness, as said Foskett, which they have secured by possessing more and more knowledge. And this is the ultimate goal of library service.

Ranganathan had an abiding affection for librarians and libraries; he wrote many a volume of enduring appeal and value. Our debt to him is endless. We respectfully and most gratefully offer our salutations of affection to this 'Humanist'.

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11.3 Ranganathan As Humanist

R.S. SAXENA

By enumerating the various qualities of head and heart of Ranganathan, the Father of Library Science in India and the shaper of the destiny of so many young librarians of the country, the author brings home the fact that Ranganathan was a true humanist in the real sense of the word. He made untiring efforts in lessening the human sufferings and saving the innocent librarians from harassment and injustice from bureaucrats and politicians and raising the status and salary of librarians and library profession to that of other dignified professions of the country.

INTRODUCTION

Ranganathan, the Father of Library Science in India was an Institution by himself. Among the various facets of his life, the inborn quality of humanism played a prominent role in shaping and moulding his personality as well as that of people who either came in contact with him through his writings or through close association in the physical sense of the word.

2 CLASSICAL SCHOLAR

According to Oxford dictionary, a Humanist is one versed in humanities and is a Classical Scholar. Ranganathan not only studied Indian classics and literature but also applied the same in his practical life thereby proving himself to be a Classical Scholar in the real sense of the word. His daily life routine, his behaviour and attitude towards his kith and kins and other relations as well as his writings, speeches, letters and talks bear ample testimony of his mastery over *Vedas*, *Puranas*, *Gita*, *Ramayana*, *Mahabharata* and similar Indian Classics. In his writings Ranganathan often used quotations of Vedas and Puranas for explaining his point of view and clinching various issues involved in solving complicated problems. While deriving the canons for cataloguing and classification he took the help of various *Niti*, given in Vedas and Puranas. His profound know-

ledge of classics specially Ramayana and Bhagwata Gita made him a versatile speaker in any religious congregation or Hindu festivals. On Ram Navmi and Janamashtami festivals he was invited at University hostels and Rotary club gatherings for giving talks on the life and teachings of Lord Rama and Krishna. On every Sunday at Madras as well as Delhi, Ranganathan gave discourses on Ramayana to a select interested group of audience which included even non-Hindus. The author had the privilege of attending regularly discourses of Ranganathan during 1951 to 1952 which were also attended by non-Hindus like Dr Ahmad, Reader, Law Faculty, Delhi University. Ranganathan fully justified the definition of a learned person as given by Emerson that a learned person is one who knows something of everything and everything of something.

3 TRADITIONAL INDIAN CULTURE

Ranganathan was the follower of traditional Indian Culture with its roots in Brahminic texts and folklores. The characters of classics made a powerful impression on him. He was deeply religious minded person and had full faith in Indian traditions and cultures. He always wore Indian dress even in foreign countries. His daily life routine included cold water bath, prayer, and putting the sandal wood mask on his forehead. He was a staunch vegetarian and was not addicted to any drink including tea or coffee. He was an embodiment of simplicity and led a very simple and pure life and his personal needs and demands were very few and to a minimum. Ranganathan during the later part of life religiously observed the principle of not touching money i.e. Lakshmi. He was the believer of the fact that Lakshmi or Maya had the maximum corrupting influence on one's mind. His wife was the custodian of the enormous money which he used to get from various sources including huge royalties for his writings, consultancy and examinerships of various institutions. His entire life's savings were invested in establishing chairs, creating endowments, trusts and donations to poor and needy persons.

4 DEVOTION TO HUMAN WELFARE

Webster dictionary defines Humanist as a person who is devoted to human welfare and one who is marked by a strong inter-

rest in or concern to man. Ranganathan being a Humanist cared for the profession above himself and above everything. Whatever Ranganathan did, he did for others and not for himself or for his personal glory. He had registered a vow with himself "to secure public library facilities to our people in a good measure as it obtains in the West."

41 *Love Towards Humanity*

Ranganathan could not see anyone in trouble and he always tried to do his level best in bringing relief to people. Whenever he heard about the illness of any of his students, he personally paid visits to their hostel rooms, talked to the wardens of such students and arranged for their better medical care and diet for them. In 1957 one student Herpal Singh fell ill and it was Ranganathan's daily routine to call at the room of Harpal at the Gwyer Hall on his way to morning walks and inquire about his health and arrange for his medicine and special diet. Similar thing he did for Mr Khurana, another student of his batch. When Shri R S. Parkhi, his one of the favourite students, developed cancer, Ranganathan provided financial assistance and arranged for his proper treatment and care by sending the Sharda Ranganathan lecture amount to him in advance and corrected his lectures himself during Parkhi's illness.

42 *Help to Poor and Needy*

Ranganathan never shirked from the responsibility of a teacher in creating a care free atmosphere for his pupil and solving their problems and removing their difficulties. He took personal interest in the welfare of his students. He wrote letters to the authorities of his students for providing them financial assistance in the form of treating the students on deputation during their training period, raising their status and salary commensurate to their knowledge and experience. He always tried to secure good jobs for his students and build their future. His shaping the destiny and moulding the career of his students of ordinary calibre and drawn from middle or lower middle class families, like P.N Kaula, Murari Lal Nagar, S. Parthasarthy, Ramachandran and R.S. Saxena, the author of the paper are glaring examples of his profound affection towards his students and his keen desire to see his students well off in their future ventures of life.

5 REVOLT AGAINST INJUSTICE, CRUELTY AND UNNECESSARY HARDSHIP

A person endowed with humanistic spirit would certainly not tolerate injustice, cruelty and unnecessary suffering or hardship to any human being and through humanitarian reforms make people happy and free from fear. Ranganathan's concept of library being a workshop or a factory and not a store house, brought a revolution in the library world and saved thousands of innocent library employees from the unjustified oppressions and penalties for losses and mutilation of library books. Ranganathan vehemently fought against the unjustified penalties imposed upon innocent librarians for the losses and mutilation of books in libraries under their charge and the securities which the library staff had to furnish for joining library service. It is only through his untiring efforts the clauses regarding the furnishing of securities by the librarian and library staff from the Service rules both at the Central as well as State Government levels have been deleted. Ranganathan has been responsible for saving thousands of innocent librarians from the cruel hands of bureaucrats and administrators who used stock taking and losses of books as the stick to beat them for some personal grudge or party politics of the institution. It is the outcome of his untiring efforts of 40 years or more that the Government recognised the truth of the statement that books are expandable and perishable material and become unfit for use with the passage of time and normal audit rules applicable to store items need not be observed for purchase, write off, disposal of mutilated/damaged books and physical verification of books. In this connection, the Ministry of Finance 4.M. No. 23 (7-E, 11 (A)/83 dated 7-4-1984 and CA, G's U.O. No. 1964—11/21-83 dated 23-12-83 changing the audit rules for libraries are the fruits of Dr Ranganathan's pain and labour for saving humanity against cruelty and injustice.

6 CONCLUSION

Ranganathan can be truly called as a "Messiah and Savant" for the Library Profession and it is through his humanistic qualities that the Library Science in India could make a mark on the map of the Library World and raise the status and salary of the library staff from that of a mere clerk to that of a professor

or high ranking officer of any institution. Like a true humanist Ranganathan led a very simple, chaste disciplined life and strictly adhered to the below mentioned principles. He had full faith in them and advised others who came in his contact to follow them so as to make their lives sublime. For work was worship and his motto was "Take up an idea, make that idea of your life, think of it, live in it and dream of it" i.e. observance of work chestity He often used to tell his disciples that work itself gives enough pleasure and one must learn to love his work and need not go elsewhere to seek pleasure in other activities like a faithful husband deriving full satisfaction and pleasure in the company of ones own wife and children.

Ideas Cherished by Dr Ranganathan

Indolence and Gossip mongering are the worst enemies of a man.

Be honest and sincere to yourself as well as to God.

Do one thing at a time i.e. practice work chastity.

Honesty and sincerity always pay ultimately.

Take up an idea, make that idea of your life, think of it, dream of it and live on it.

Be regular in your work.

Be punctual.

Maya i.e. money has the most corrupting influence on one's mind and do not be mad after it.

Develop an analytical mind. Analyse problems into different facets.

Reduce your wants to a minimum. Lead as simple life as possible.

Do not believe in false prestige and be honest and straight forward in your dealings.

Sleep well and give enough rest to your mind and body.

Observe economy in every activity of your life i.e. observe law of parsimony everywhere.

Never loose heart. Have faith in yourself and in God.

Carry your dharma to the fullest extent.

11.4 Dr S.R. Ranganathan—A Great Teacher and a Humanist

[J S SHARMA

Highlights Dr S.R. Ranganathan's qualities as a great librarian, a dedicated teacher of Library Science and as a human being. It was because of him that librarianship has emerged as a discipline in India. The author switched over to this profession due to Shri SR Ranganathan's influence and help and could continue further study in the U.S. Ranganathan's contributions in colon classification, cataloguing, chain, procedure, library organisation, administration, reference service, etc have influenced all his followers.

I INTRODUCTION

Dr Ranganathan was not only a great librarian and inventor of Colon Classification but also was a great teacher and humanist. After lapse of a century, people will not believe that such a man walked on earth in blood and flesh. In fact because of his humanism, gentle manners, he picked us up from the dust and made us what we are today. It is he who in India converted librarianship into a discipline and brought it par with teachers giving us status and dignity. A large number of books, articles and papers have already been written by scholars highlighting his contribution to his philosophy of life, classification, chain procedure, cataloguing, library organisation, administration, reference service, standardization in library, library documentation practice and information technology and its use in library and information services. In the following sentences I have made a humble attempt to depict him as a great teacher and a humanist.

It was about 5 p.m. when I was absorbed almost thirty-eight years ago in reading some preliminary material in the reading room of the Library of the Delhi University in connection with my Ph.D. thesis, entitled Farrukh-Siyar, one of the later Mughals. Mr P.K. Garde, who was in those days working in the University Library and was very popular among research scholars, came to me, along with another research fellow in

History, and asked me if I was interested in attending the lecture of a distinguished librarian of India. He further told me that the librarian had come as a guest of Sir Maurice Gwyer, the then Chief Justice of India and also Vice-Chancellor of the Delhi University. I was a little hesitant, since I had to complete the chapter in hand, but the suggestion made by him was too strong to be resisted by me when he further told me that he himself would love to hear a learned person, who was known as the "Father of Library Science" in India. Within a few minutes, I returned the book which was from the 'Reserve Section' which I was consulting and went along with him. The hall, built about a century ago, was small and looked magnificent with its walls and ceiling covered with Burma teak. The distinguished guests were seated in the front row and the teachers and the students occupied the hind rows and the hall was almost packed to capacity. After having been introduced to the audience by Sir Maurice Gwyer, the distinguished speaker, Dr S.R. Ranganathan, who wore a white turban with gold lace, the usual south Indian headgear, the sacred mark (*tilak*) on his forehead and a pair of spectacles, stood up from one of the chairs on the dais and started speaking on the importance of library science. I listened to him with rapt attention. He spoke very fluently in the English language, of course, with his south Indian accent. He made a remarkable speech, matching almost Dr S Radhakrishnan's speeches which I had listened to a couple of years back in the same hall.

Ranganathan recounted his experience of visiting some libraries in London and his training in librarianship in the UK. He also narrated how he had organized the library of the Madras University. He explained his scheme of Colon Classification and his other writings, especially Five Laws of Library Science. He expressed in brief his views on the condition of library profession in India and convinced his audience that if the country desired to progress intellectually, it was essential that the library profession should occupy its place of honour. He even made the statement, "If *moksha* is to be achieved, adopt the library profession." There was pindrop silence in the hall and such a forthright statement seemed to have stunned everybody. I was one of those who were not wholly convinced of what he said.

After the meeting, I came out of the hall along with my friends and returned home. The words uttered by this great librarian of India kept resounding in my ears and their importance

lingered in my mind for a long time. Being a very sensitive person, I just could not ignore those ideas and continued to brood over them. Next day, as usual, I came to the library and picked up from the shelf the same book, which I had been reading the previous evening to complete the chapter of my thesis. As usual, in the afternoon, I, along with Mr Garde, went to enjoy me cup of coffee in the University Branch of the Indian Coffee House. It was natural for us to discuss some of the points raised by the speaker the previous evening. Since those ideas had gripped my mind, I was anxious to meet the speaker, if possible. Mr Garde told me that it was not difficult to meet him, since he had been invited that evening to address the library staff at 4 p.m. That was a happy news to me. After the meeting was over, light refreshments were served. During that time, as is usual, people met one another to exchange ideas. I was one of the persons who were introduced to the distinguished guest. Since the previous evening I had been trying to rearrange my disarrayed ideas. Now I felt that this was the right opportunity to get them clarified. I asked Dr Ranganathan how *Moksha* (salvation) could be attained simply by being a librarian and not a saint or a *rishi* according to the Indian tradition. He was full of humour on being asked such a question. In a very simple, yet straightforward manner, he told me that library service was perhaps the most impersonal service, and if somebody did that service with devotion and with a pure heart, irrespective of caste, creed or colour and not considering whether a man was rich or poor, he did real service to humanity. Since there are not strings attached to this service, like the great men of the past who always served humanity by inculcating noble ideas in the people and this continued to live in their hearts, though not existing in their physical forms. After all, this body (*sharirah*) shall inevitably be destroyed one day, but one's service to humanity was neither destroyed by time nor by war nor by any catastrophic happening. A librarian who served his readers with such a spirit attained *moksha*.

Ranganathan's remarks were illuminating and I began to feel that library profession was something worth adopting. But how could I adopt it? I was doing my research in History and I wanted to become a teacher at a University. I was also planning to go to the University of London to obtain my doctorate in History from there. The preliminary work for my admission to that University had already been completed.

But God's ways are mysterious. He ordained otherwise, India was partitioned and my adviser, Dr. I.H. Qureshi opted for migration to Pakistan. As I was left without a guide, my interest in the subject of my research dwindled, and the flame of my love for library science burned brighter and brighter. But how could my ideas materialize at the University of Delhi where there was no provision for the teaching of Library Science? There was no alternative but to go to Madras.

Fortunately enough, when my plans were still fluid, a good news was conveyed to me by Mr Garde and my teacher, Professor S. Das Gupta, that the Department of Library Science was being set up at the Delhi University, with that distinguished speaker as an honorary professor and with Professor S. Das. Gupta as its Head and Shri Garde as one of the teachers. One can imagine my state of mind when this news was conveyed to me. I wrote down an application for admission to the course and I was selected. This is how I was initiated into the library profession.

As stated earlier, I wanted to go to the University of London for my Ph.D. in History, but after I obtained admission to the Postgraduate Diploma Course in Library Science, and after the University of Delhi declared that I had passed the examination in July, 1948, my interest shifted to the United States. since I was told that the State had better facilities for training librarians. I started correspondence with many American universities which offered courses of study in library Science. While I was making those efforts, I was advised that a letter from the great librarian, Ranganathan would help me immensely. I was a little hesitant to go to meet him, because I had come to know that it was rather difficult to approach such an eminent person, but, to my great surprise, when ultimately I went to see him, he was very cordial and kind, and dictated a letter which he handed over to me. That was such an excellent letter that I have treasured it with all my heart even up to this day. The other two well wishers who kindly gave me similar letters were Dr. V K.R.V. Rao, former Vice-Chancellor of the Delhi University and Mr S. Das Gupta, Head of the Department of Library Science and Librarian of the University of Delhi. I got my admission and I went to the United States in August 1948, got training and came back to India after having obtained the degrees of M.A. and Ph.D. in Library Science from the University of Michigan in June 1954.

The Father of Library Science, Ranganathan passed away on 28 September 1972 at Bangalore. The Government of India honoured him with the title of 'Rao Sahib (1935) Padmashri (1957) and later he was made the first National Professor of Library Science in India.

In Madras, Ranganathan, as the Librarian of the Madras University Library, started a certificate course in Library Science in 1929 under the auspices of the Madras Library Association. The University of Madras took over the course in 1931 and made it a diploma course. The teachers for the course were in-service librarians and the University Library was used as the laboratory for the trainees. At the University of Delhi, Ranganathan was also the initiator for imparting library education. The classes were started in July 1947. I am proud of the fact that I was one of the students of the first batch. The training classes were held in the gallery of the former dancing-Hall of the Viceregal Lodge, Delhi.

The small area of the gallery was converted into a class room, a small room for Ranganathan and a cabin for the stenographer. Some reference books, the copies of Colon Classification, Decimal Classification and a few periodicals were also placed there for the use of the students. In the first batch, we were only four students (one one of them, Shrimati Kamla Kapur who later became the Librarian of the USIS, New Delhi).

Ranganathan preferred to sit most of the time at the end of one of the rows of the library stacks. He had a small table and an ordinary chair. The students normally used to discuss their problems with him at his seat. There was no full-time staff to teach library science when the courses were started in July 1947.

Ranganathan was the Honorary Professor and Sir Maurice Gwyer, the then Vice-Chancellor, allowed him free residence and some meagre honorarium. Among the other teachers were Mr Das Gupta, Mr Ranganathan and Mr P.K. Garde. Ranganathan used to teach us Classification, whereas Mr Das Gupta used to teach us Organisation and Administration. Mr Gorde taught us Reference Service and Book selection. As was quite natural, Ranganathan laid more emphasis on Colon Classification which he had himself devised, rather than on Dewey Decimal or any other system of Classification. But whatever he taught us was inspiring. He used to come from his resi-

dence barefoot, donning a turban, and with a *tilak* on his forehead. He was very punctual, and was a strict disciplinarian.

Mr Das Gupta had a great regard and respect for Dr Ranganathan. Once during a dinner given by UNESCO to the delegates of a library seminar in October 1955, at the Maiden Hotel, Delhi, one of the delegates criticized Ranganathan's way of working. Mr Das Gupta politely, though firmly, defended Dr Ranganathan. That was the degree of his loyalty to his former teacher. In fact, everybody was very much devoted to Dr Ranganathan, because of his great qualities of head and heart. As a great teacher and humanist, he will always be remembered by his colleagues and students.